

TWEED'S POULTRY-KEEPING IN INDIA

A PRACTICAL BOOK ON THE MANAGEMENT OF FOWLS
INCLUDING THE DIAGNOSIS AND TREATMENT OF
DISEASE. THE VARIOUS BREEDS ARE DESCRIBED,
AND THE MEANS OF RENDERING THEM PROFITABLE

NINTH EDITION

REVISED AND BROUGHT UP-TO-DATE

BY

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ILLUSTRATED

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ISA TWEED'S
POULTRY-KEEPING IN INDIA
INCLUDING
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GUINEA-FOWLS, PIGEONS,
PEA-FOWLS AND RABBITS,
TWO VOLUMES IN ONE

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FOREWORD

BY

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Fowls are more widely distributed than any other class of domesticated animal. Though they have been domesticated for several thousands of years, it is only during the present century that poultry-keeping has become such an important and highly specialized industry. The recent rapid developments in the industry are due to a number of factors. (1) The modern demand for highly palatable and nutritive foods, such as poultry meat and eggs. (2) Improvements in transport and storage which have rendered it possible for poultry products to be transported over long distances from producing to consuming areas. (3) Discoveries by research workers which facilitate the hatching and rearing of large numbers of birds at all seasons of the year. (4) By selective breeding fowls have been made more efficient utilisers of cereals and their by-products.

India, though it is the original home of the wild jungle fowl from which all our modern breeds of poultry have sprung, has until very recently given little attention to developing its poultry industry, though a few individuals try to keep fowls on modern lines. The majority of the fowl population is kept under very primitive conditions of housing, feeding and management. Further, as little attention has been devoted to selective breeding, the majority of the birds are uneconomic both as meat and egg producers. Owing to defective methods of production and marketing, poultry products are normally of very poor quality when they reach the consumer. The low quality of the poultry and eggs marketed, in conjunction with the ignorance of the general public in

regard to their nutritive values, has resulted in low consumption and poor prices.

Increased egg consumption in India is very essential for the welfare of the population in many parts, but more especially in the rice-consuming areas, the diet is very deficient in proteins and vitamins. Recent work at the Indian Veterinary Research Institute has demonstrated the high biological value of eggs and their value in supplementing defective human diets. The scope for increasing and improving the production of poultry products in India is enormous for the average annual consumption of eggs per head of population is only eight, whereas the generally accepted figure for well-fed communities is one egg per person per day. Further, as India has cheap raw products for feeding fowls, the industry could, if organised, build up a lucrative export trade to countries less favourably situated as regards production.

It is pleasing to note that in recent years much more attention has been devoted by the Central Government, the Provinces and the States to improving poultry-keeping in all parts of the country. In addition to the Central Poultry Institute attached to the Imperial Veterinary Research Institute, Izatnagar, practically all the provinces and states have established one or more poultry farms either as distributing or educational centres. The valuable pioneer work of various missionary bodies in improving the poultry industry also requires special mention.

The dissemination of improved stock is one of the first essentials for improving the industry. Lack of large number of good stock is however at present a major factor in holding up development work. The scarcity of good stock is in no small measure due to lack of knowledge in regard to how to keep birds and the presence of a number of very deadly contagious diseases. Though we now have means of controlling diseases such as fowl pox, tick fever and fowl cholera, the general public has been slow to use the proper control methods. Though no control measures in regard to the dreaded

Ranikhet disease have yet been marked, the position in regard to control is now very hopeful, for research work is sufficiently advanced to predict that a reliable vaccine will soon be issued.

The dissemination of up-to-date knowledge on all aspects of production is vital for the welfare of the industry. As India has few modern books on poultry-keeping and as the methods of production advocated by writers in other countries are unsuited for Indian conditions, contributions of any form of acknowledged experts are extremely valuable. Mr. Slater needs no introduction to poultry enthusiasts in India for he has been breeding and exhibiting birds for a period of over 30 years. His intimate knowledge of poultry farming in all its aspects renders him unusually well qualified for revising and enlarging what has already proved to be a popular and useful guide to poultry-keepers.

1944.



PREFACE TO THE NINTH EDITION

Rapid developments in the poultry industry have taken place in the twelve years since the 1948 edition was published. This is a new India, and the interest and demand for poultry products has increased at such a rate that it is necessary to bring up-to-date information on nutrition, the addition of antibiotics such as Terramycin in the drinking water, vitamins and disease control.

The science of poultry nutrition has advanced rapidly and many important contributions to it have been made since the eighth edition of this book was written. To bring the contents up to date, deletions and changes have been made in the text, additions have been included and new feed formulas now in use have been inserted.

The Publishers, Thacker, Spink and Co. (1933) Private Ltd., have again honoured me by asking that I undertake this work. This I am glad to do with the hope that this enlarged standard work with its popularity and reputation, will prove to be even more useful than in the past.

It is encouraging that there has been a steady growing demand for table eggs. More and more eggs are being demanded for the Delhi market, also by many other large cities.

The great value of eggs in supplementing defective human diets has been demonstrated by the Indian Veterinary Research Institute at Izatnagar, U. P. In many areas of India, especially the rice consuming areas, the diet is very deficient in proteins and vitamins. Eggs can play a great part in helping to build up a virile, healthy people. Religious prejudices against eating eggs need not enter into the question, for infertile eggs are easy to produce and thus the taking of life does not come in.

Is it not strange that many people in India consider fowls to be *nāpāk* (unclean) when we remember that India is the original home of the jungle fowl from which all our modern breeds have sprung? Should we not make every effort to stimulate and foster the poultry industry and appreciate our feathered friends?

It is my earnest hope that this enlarged revised edition will prove more useful than ever to the people of India, and especially to students.

We can say that in spite of great difficulties, free India since independence is making good progress and the Government and people, by and large, are working with faith in their future. Let us hope that this same faith will lead to great developments in the poultry industry so that India may take its place among the nations in the matter of poultry production.

The author is indebted to the U. S. Dept. of Agriculture for publications and to the Poultry Division, U. S. D. A Research Center, Beltsville, Maryland for the latest information on research on poultry diseases and nutritional problems. Also, Dr. Phillips, head of the Dept. of Poultry, Poultry Industry, Iowa State College, Ames, Iowa has rendered valuable assistance on problems of feeding, nutrition, disease control, etc. Dr. Stanley L. Balloun, associate professor of Poultry Nutrition has given me much assistance.

I am also indebted to Dr. Nels Konnerup, DVM, of the Foreign Agricultural Service (F. A. S.) of the U. S. Dept. of Agriculture for the latest up-to-date information in regard to a new vaccine for Ranikhet, manufactured by the Indian Veterinary Research Institute at Mukteswar and Izatnagar, U. P. See the chapter on Ranikhet for this, important information.

It may be mentioned that Iowa ranks first in the U. S. A. in poultry and egg production. The state has 40,000,000 fowls. Many farm flocks are important revenue producing assets.

This book is sent out with the hope that through its study many families will have a better living from their chickens, because of better care, up-to-date methods of feeding, and successful control of diseases.

PREFACE TO THE SEVENTH EDITION

With the wide increase of poultry-keeping in India, there is a growing demand for literature that deals comprehensively, and practically with the subject.

Since the first edition of this book was published, many people from the European, Anglo-Indian and Indian communities in this country, have become interested in poultry. Some of these have made a profitable business of it. Others have obtained great pleasure from it as a hobby. More are taking it up every year. Caste prejudice is slowly breaking down, and in all parts of the country people are finding how easy it is to keep fowls profitably, if they are housed and fed correctly, and the diagnosis and treatment of disease understood.

The question of contagious diseases, particularly that deadly complaint known in India as "Ranikhet disease", and also "Spirochaetosis" ("tick fever") always looms large in the mind of anyone considering keeping poultry in India.

A great step forward therefore was made when the Government of India appointed an Officer-in-charge, Poultry Research Section, Imperial Veterinary Research Institute, Izatnagar, U.P. to study the whole problem of poultry-keeping in India. At the same institution is a Research Officer, Poultry Diseases. We may therefore confidently predict that there will be less ground for these fears in the future, and a careful study of the last chapters in this book, dealing with these two chief scourges, i.e., "Ranikhet" and "tick fever" will materially assist poultry-keepers, for to be forewarned is to be forearmed.

Tweed's Poultry-Keeping In India has been a standard in this country for many years. Its popularity and high reputation have been well deserved. It would be hard to find a book more helpful in every way.

Later methods of housing and feeding have made additions necessary. The book has been carefully revised and been brought up to date.

The addition of the illustrations makes the book more interesting and attractive, as they give the standards up to which all fanciers should endeavour to breed.

For a large number of our many and varied illustrations, we are indebted to the Poultry Press Ltd., for their generous loan of blocks, also for their kindness and courtesy to us in general.

We trust that this revised and larger edition will provide a pleasant and profitable study for all who are interested in poultry-keeping and breeding in India.

Mission Poultry Farm,
Etah, U. P.
May, 1944

A. E. SLATER

PREFACE TO THE EIGHTH EDITION

It is most gratifying to note the warm response to the last revised edition brought out in 1944. Another printing is necessary. The Publishers, Thacker, Spink & Co., have again honoured me by asking that I undertake this revision.

Few changes have been made. There are some corrections and additions. One important fact stands out. Great progress has been made since 1944 in regard to Ranikhet disease. The writer would particularly draw attention to the latter part of Chapter XVII where how to prevent this dreaded disease is fully dealt with. The fact that fowls can now be successfully vaccinated and immunity thereby given, is a notable advance.

There is a growing interest today in poultry-keeping in India. Many are keeping a few good fowls either for pleasure or to provide themselves with eggs and meat. Many villagers are keeping them as a profitable cottage industry. Others are opening commercial poultry farms. There are also a large number of Government Poultry Farms. Some are interested in poultry shows.

It is, therefore, important that a working knowledge of how to keep and breed fowls, protect them against disease and cure them when sick should be spread far and wide.

The inclusion of Tweed's Indian Handbook on Ducks, Geese, Turkeys, Guinea-Fowls, Pigeons, Pea-Fowls and Rabbits, make this book much more comprehensive and useful.

If the reader finds this book helpful, he or she can do much by bringing it to the attention to his or her friends.

The author is indebted to the Maharaja of Pithapuram for reading the 1944 revised edition and offering valuable sugges-

tions and suggesting certain corrections, which have accordingly been made. The Maharaja is a lover and keen breeder of good poultry, and has also kept Bantams for more than 40 years.

Mission Poultry Farm,
Etah, U. P.
November, 1948

A. E. SLATER

POULTRY MAGAZINES AND JOURNALS

The following Papers are recommended to those wishing to keep in touch with matters concerning poultry-keeping. It should be remembered, however, that while those published out of India are quite reliable when describing poultry, their diseases and cures, yet climatic differences make their advice as to housing and feeding applicable only to those living in the hills of India.

INDIA

Indian Poultry Gazette. Editor, Capt. S. B. V. Rao, Indian Poultry Club, Indian Veterinary Research Institute, Izatnagar, U. P.

GREAT BRITAIN

Poultry (Weekly)
Poultry World (Weekly)
Utility Poultry Journal
* (Monthly)
Poultry Club Year Book
Poultry World Annual
Racing Pigeon
Poultry Year Book

U. S. A.

Poultry Tribune
Mount Morris, Illinois
U. S. Egg & Poultry Magazine
Chicago, Illinois
Poultry Science
College Station, Texas
Poultry Digest
Sea Isle City, New Jersey
Egg Producer
180 N. Wabash Ave.
Chicago 1, Illinois
Broiler Growing
Mount Morris, Illinois

SOME STANDARD BOOKS ON POULTRY

The Illustrated Book of Poultry (latest revised edition).

By Lewis Wright.

The Poultry Club Standards (latest edition) By William W.
Broomhead.

Poultry Breeding By Jull.

Poultry Production. By Lippincott.

Poultry Diseases. By Berger & Oard.

The Scientific Feeding of Chickens. By Titus.

The Interstate, Danville, Illinois.

Commercial Poultry Production. By Marble and Jeffey.

The Ronald Press, New York.

Poultry Science and Practice. By Winter and Funk.

J. B. Lippincott Co., Chicago, Illinois.

Messrs. Thacker, Spink & Co. (1933) Private Ltd. will be
pleased to procure any of the above. Correspondence
invited.

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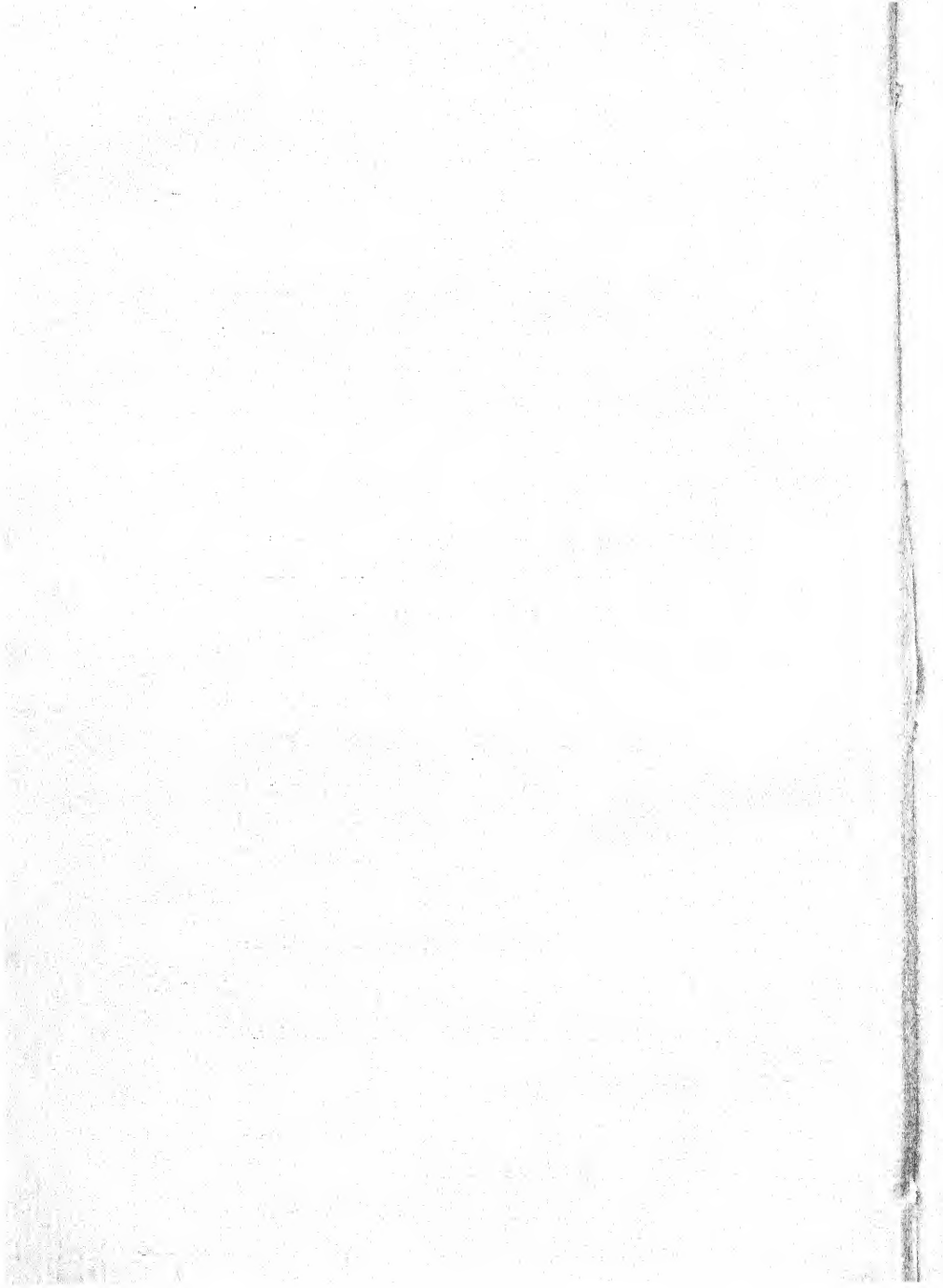
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CHAPTER I

PLEASURE AND PROFIT OF KEEPING AND BREEDING POULTRY

Poultry-keepers in India can be divided into five classes. First, we have the villagers. They mostly keep scrub or *desi* fowls, giving them little care, attention or food. They sell the eggs or poultry to collectors who gather them up for dispatch to the cities.

Then we have the person who stocks and runs a large commercial farm. There are also people who keep their poultry as a hobby, but hoping for some return from it. Some people with a love for fowls keep them for pleasure only. There are also now in the country many Government Poultry Farms and State Farms.

Poultry-keeping can be a profitable business in India. People who give their time and labour to it, as they would do to any other business, are well repaid for recently there has been a large and growing demand for larger and better eggs and for better table poultry.

As the breeding and rearing of poultry is almost entirely in the hands of poor and ignorant Indians, the eggs supplied to the market are small and ungraded, and the fowls poor in quality and flavour.

Some people think that poultry-keeping is degrading to their own social standing. If these people can eat and enjoy poultry and eggs, why should they consider it beneath their dignity to produce them? Any householder is proud of a well-kept fruit or vegetable garden. Can he not be equally proud of a well-kept fowl yard?

It is surprising that the several governments in India do not do more to foster the industry. Bigger and better eggs

mean more nourishment to the consumer, and surely the health of the people should be a government's first concern.

It is encouraging to note however that an advance has been made. Today there are several Poultry Experts and Research officers. The Animal Husbandry Department of the Government of Uttar Pradesh has done much. The Government of India with its Indian Veterinary Research Institute at Izatnagar, U. P. have a Central Poultry Institute which is doing valuable work. Poultry-keepers are well advised to visit Lucknow and Izatnagar and to write for advice and assistance.

India has changed and is changing. Today the central government, the provinces and the states are improving poultry-keeping. Practically all have established one or more poultry farms either as distributing or educational centres. Various missionary bodies have done valuable pioneer work and can do more. India needs to stress "Grow More Food", and "Grow More Poultry" campaigns, and missionaries can encourage this good work.

Women and children usually take better care of poultry than men and take more pleasure in this work. Children can do a great deal towards this, although it would not be wise to leave them without supervision. Being young and enthusiastic, they do not tire of their work, but learn to love it more and more as they get older.

Well-to-do parents long for good, fresh eggs to give to their children. These are very difficult to obtain in a country where the heat is so great that the eggs are often spoiled before they are gathered. Why do not these people keep fowls to supply their needs? Surely any parent, who has his or her children's welfare at heart, would not think it too much trouble to rise half-an-hour earlier in the morning, to feed and attend to a few fowls. How excited a child is over a present of a really fresh egg! while the joy of picking one up, fresh from his own pet hen, is only excelled by the happiness with which he proceeds to eat the same egg, after it has been

nicely prepared for him. Why do not more parents give this pleasure to their children, whose little appetites require so much tempting, when the hot weather is slowly sapping their strength and energy ?

Many people have failed in their attempts to keep poultry. Often they have blamed the country, sometimes they have blamed the fowls, but seldom have they blamed themselves ! what has really been the trouble ?

Fowls need attention. Reliable servants are hard to find and when found we discover ; probably, that a former master or mistress has, by constant supervision, instilled in them the right methods to adopt. Even good servants are not infallible and the only wise course for a person to pursue is to devote a certain time daily towards the feeding and care of the fowls.

It is impossible to make a success of poultry-keeping unless one's fowls are well-housed, well-fed and supplied with a sufficient quantity of good drinking water. Cleanliness in all things is essential. How can hens lay eggs when they are uncomfortable ? How can they produce them when they are ill-fed ? Nothing is derived from nothing ; and only by careful attention to these essentials can one be successful.

For beginners, the wisest plan to adopt is to keep only one breed, or at the most, two. If two pens are kept, one should be of light breed and the other of heavy breed birds, as by this means, a more regular supply of eggs is obtained. Begin with one cock and four to six hens in a pen. Procure a copy of this book and read it carefully. Make a study of the breed you have and do your best in caring for the birds. Your success will be assured. Begin in a small way, and gradually increase if you so desire. By this means, you will be prepared for any emergency that may arise.

The Fascination of Poultry-Breeding—There is a strong fascination in the breeding and rearing of poultry. Men and women of all classes pursue it with unbounded enthusiasm. Some exhibit, some do not. Some sell their superfluous stock

and eggs, others never take money but prefer to give away what they do not require, to friends who are less fortunate. Whatever the circumstances, seldom does a fancier give it up entirely. The fascination is a strong and lasting one. Even in old age, men and women will proudly talk of the birds that they have owned and kept.

What is the secret of this fascination ?

Decidedly, the greatest factor of all is the beauty of the fowls. Many and varied as the breeds are, they find their several admirers. One person favours a highly-coloured fowl; another enjoys the sight of a pure-white bird with its contrasting red comb and wattles ; while still another admires the beautiful sheen on a black one. Fancy breeds with their long graceful tails, topknots, or other characteristics, call forth exclamations of delight from even the old stagers. The larger the bird, the more it appeals to one person, while the quick, active movements of the light breeds fascinate another.

Even the combs and legs of the birds have their own particular fanciers, for while the straight, upright comb appeals to most of us, the fancy combs of the Wyandottes, Buttercups, etc., still have their supporters.

Never are we at a standstill, and the steady, systematic crossing and developing of the breeds we have at present, will result in new and greater beauties, to gladden the hearts of all poultry-lovers.

Another of the secrets of this fascination is to be found in the love for living things. A child loves its doll, but if it is given a kitten or puppy—something that is alive—it quickly transfers its affection to the living creature. Men are but grownup children after all and this feeling survives even in the adult. We never outgrow it, we may change the object of our affection, but the love for living things still abides. So in the life of the poultry-yard, from the little ball of down with beady eyes which emerges from the egg, to the fully-developed fowl, pleasure is found. The ways of these feathered dependants, the courage and gallantry of the

cocks, the motherly instincts of the hens and the perky inquisitiveness of the chickens afford a pure and healthy pleasure. Then, too, the growth of the chicken from the time it is hatching until it assumes the *toga virilis*, the varying changes in size, shape and coloration, afford a perennial charm.

Still another of the secrets of this fascination, which has a stronger hold upon the more intellectual breeders, is the opportunity to study the laws of life. The great problems of biology are helped in their solution by the student who breeds poultry. The beginning and progress of life in the egg, the relation of growth to food and other elements, the laws of variation and heredity, the effects of inbreeding and outbreeding, all find illustration in this pursuit.

The development of different breeds, whether derived from some common ancestor or the result of many special creations, can be studied to great advantage in the poultry-yard. Indeed, it is not extravagant to say that there are few, if any, better fields for such investigations, and the more thoughtful and observant of breeders are almost necessarily led into the consideration of these great questions. Some of these questions intrude themselves upon the attention of every breeder, even the least thoughtful and observant, for his breeding operations cannot be carried on successfully without at least a superficial knowledge of these particular laws of life. In this way every breeder becomes, in some degree, a student of biology and finds in this study an intellectual pleasure and benefit. The beauty of it all is that, unlike so much human knowledge, this knowledge comes by a royal and easy road. There are no burnings of the midnight oil, no aches of the weary brain, only the simple joy of outdoor observation.

All these things combine to produce this wonderful fascination, but probably the greatest factor of all consists in the power that man finds himself able to exercise over these lives, in moulding them to his will. This one cause, alone, would be an ample explanation of the fascination of

poultry-breeding. Fowls possess a constitution of wonderful plasticity. As the variations appear from year to year in breeds, either through the natural tendency to vary, or through that tendency multiplied by the matings made by man, the breeder seizes upon such as suit his purposes, and thus modifies, improves, changes and transforms the diverse characteristics of his flocks, as his aim and purpose may be. Old breeds are improved, new breeds are created. Man is here exercising a power that seems to him to be somewhat akin, however far removed in degree, to the creative power of his Maker. The exercise of this power gives him a sense of his greatness, as compared to the lower orders of creation, and assures him of his own importance in the workings of this great universe of ours. Such are some of the causes which help to explain the great fascination of poultry-keeping, a fascination which seems never to lose its power over the man who has once fallen under its influence. Circumstances may compel him to give up breeding fowls, but the contemplation of their charms, the study of the laws of life, and the admiration for the work of the most skillful breeders remain. These are a present possession that nothing can divest him of. In sickness or health, in poverty or wealth, amid the cares of a busy life, shut in by brick and stone walls where fowls are never seen, he still can enjoy the remembrance of the fowls he had bred and the knowledge he has attained.

Begin in a Small Way—Success or failure with poultry depends upon the poultryman himself. There are good opportunities of making money with poultry and many ways of saving money by judicious arrangements and close attention to details. But for the beginner to suppose that, because he is provided with a certain amount of money and can secure a likely looking place for business, success is certain is a mistake that may result in disappointment. Although at first matters may seem easy, the undertaking may sooner or later end in a very sad awakening to the reality of a hopeless

failure. We often buy our experience dearly, and for this reason it is better for us to gain our experience before launching out into the deep and risking our all on untried waters. As an adjunct to a business that does pay, poultry-keeping could be begun on small lines and gradually increased until it becomes more and more profitable and latter on becomes an all-sufficient and exclusive business. Make haste slowly and do not expect to learn in a few months what has taken other men years of hard work and experience to attain. It is by far the best to make up your mind which particular breed of fowls will best suit your requirements, and keep only to that breed until you have made a success of it. Then another breed might be tried and so on until one is satisfied that the best possible results are being obtained.

Women And Poultry-Keeping—It is an accepted fact in most parts of the world that women make the poultry-keepers. One reason for this is their attention to detail. This is a most important factor in poultry-keeping as in other businesses. There are hundreds of ways of saving or wasting money in and around a poultry farm or yard. Usually a woman has more time at her disposal than a man and can see to the proper feeding of the fowls, the cleansing of the various utensils, and the necessary sweeping and tidying. It is not necessary for a woman to spend her whole day in the hen-house, nor is it necessary for her to undertake duties that are distasteful to her. In India, servants are easily obtained and with oversight and proper instruction, they can be directed to care for the fowls in the proper way. Half an hour out of doors in the early morning would be sufficient for the ordinary poultry-yard to be tidied, the birds fed and watered, and everything left ready for the day. Children also would benefit from the interest that would be aroused in them by the care of these living creatures. Fowls need kind treatment and women and children are more ready with their kindnesses, as a rule, than men. Perhaps this is because they have more vivid imaginations. It needs a woman's

imagination to realise what a bird must be feeling like on a hot day without a cold drink, or on a bitterly cold night without sufficient protection from the biting wind. Again, the sight of a nest full of soft fluffy chickens will always arouse the mother instinct in a woman's heart, and a fellow-feeling for the hen-mother in her watchful care of her helpless little ones will stimulate her to do all she can to make the little family happy and comfortable.

CHAPTER II

THE GROUND SUITED FOR POULTRY-REARING

Soil—Poultry can be kept with varied success all over India, but any portion of the country where the soil is sandy, gravelly, and abounding in *kunkar*, with a good proportion of lime or chalk in it and with a natural drainage, is admirably adapted to the rearing of fowls, especially so where the rainfall is not excessive. The more elevated, porous, and well-drained the soil is, the better. Stony ground, however, is bad for fowls as it hurts their feet and causes bumble-foot. The heavier the soil is and the more it retains moisture, the worse it will be for the fowls that have to stay on it. Marshy, dirty, or badly drained grounds are fatal to fowls. The side of a hill with a south or south-east aspect makes an ideal poultry-run.

Shelter—Poultry must be sheltered from the sharp, cold north and east winds and from heavy rain. If they are allowed to walk about in water or to be chilled by the cold winds, they will not thrive. During the cold weather and rains the north of the shed must be kept closed and movable screens put upon the west and east to protect from the cold and rains at night.

Shade—Poultry need to be protected from the midday sun and the hot winds during the hot season. There should be a shed and a number of large shrubs and trees for shade to protect the fowls from the heat. During the hot weather the west side of the house and shed should be closed during the day and opened at night. The south and east are the coolest during the hot season and should be kept open. A large number of birds are killed by the heat. Unless sufficient shade is provided for the birds, they will suffer and die.

The best trees for shade are the Mango, Jack, Nim, Orange, Lime, Pumalo, Lichee, Mulberry, Star-apple, Rose-apple, and Jaman. Where there are no trees, some should

be planted immediately. The Mango grafts, Lichee and Jack should be planted thirty feet apart. The Pumalo, Orange, Mulberry, Lime, and Nim should be planted only fifteen feet apart. It is a good plan to plant clumps of Hibiscus or Plantain four feet apart on the four sides of the yard. On the hills there should be trees enough to give shelter to the birds. The bare side of the hill is most unsuitable for poultry.

Fruit growing and poultry-keeping make an ideal and profitable combination.

Until the trees and shrubs grow sufficiently large to afford enough shade, some other plan must be adopted to provide shade for the birds.

PLAN OF MODEL POULTRY-HOUSE AND RUN

Fowl-house 10'×10'×8'	Scratching shed 10'×15'×8'	Scratching shed 10'×15'×8'	Fowl-house 10'×15'×8'
D. D.		D. D.	
Run for 10 Fowls 40'×25'		Run for 10 Fowls 40'×25'	
door		door	

If desired for a larger number of fowls, the runs should be increased accordingly. The houses and sheds would supply sufficient accommodation for at least 40 fowls in all, but it would be advisable to double the runs for the same number if possible.

The galvanized iron at the bottom of the fence is sunk six inches into the ground, to ensure against rats. Above the iron is a strip of half-inch mesh wire-netting, to guard against snakes and the destructive mongoose. Two inch mesh wire-netting completes a most practical and serviceable fence, which should reach a height of at least six feet six inches.

A shed, from ten to fifteen feet square made of bamboo and straw and raised on bamboo posts three feet from the ground, should be made in a convenient and high part of the run. The posts should be put two feet into the ground and there should be a good thick layer of straw on the shed. This shed is best placed on the east of the poultry-house. The ground under the shed should be raised and properly drained. In a large run a number of small sheds should be made.

CHAPTER III

FOWL-HOUSE, SHED AND YARD

Space—Fowls can be kept on the intensive system in the hills of India, but it is not advisable to try this in the plains. There they need a run of some sort, as much for the fresher and cooler air to be had in the early morning and late afternoon, as for the exercise to be obtained. They must never be crowded under any circumstances, nor must they be kept in close confinement. The more space allowed them the better. It is true that fowls may be confined and kept under the "battery" system. If table eggs alone are required, this may be done and the birds remain healthy. Breeding stock however should not be closely confined, as, if so, the hatchability of their eggs will be much weakened.

The House—Each adult fowl requires at least twenty-five cubic feet of space. A house six feet long, five feet wide and five feet high will accommodate six birds comfortably.

The Shed—There ought always to be an open shed or verandah attached to the fowl-house to serve as a shelter for the birds from rain and the midday sun. The shed should be, if possible, as wide and twice as long as the house, but if it be of the same size, it will be sufficient.

The Yard—This must be left to the convenience of the poultry-breeder. Sometimes it is impossible to have a large run. In such a case a small one will answer the purpose, provided the birds are supplied with a good scratching litter in the shed, plenty of green food, animal food in some form or other, grit and lime.

Perhaps the ideal plan for the small breeder is to give his birds the run of his compound, whenever possible. They will find all these necessities for themselves and will be healthier and happier as it is more natural for them.

Where this is not possible, as large a run as is convenient should be provided. About a hundred square feet per bird is quite satisfactory. Some breeds of fowls are quarrelsome and unless sufficient room for roaming is provided, the more energetic of them will worry the weaker and smaller ones and deprive them of their food. They have even been known to peck them, resulting in the vice of feather-eating until the poor unfortunate birds have had to be destroyed.

For a pen of six birds and a house similar to that mentioned above, a run measuring forty feet by thirty feet is recommended.

Construction—The fowl-house should be built of either metal (see Fig. 38A), or brick or wood. If of brick, it must be made smooth and whitewashed with lime both inside and out. If of wood, the interior should be painted with a mixture of seven parts kerosene oil and one part tar and the outside painted first with kerosene oil and then with white paint or whitewashed with lime. Never put tar on the top or outside of a wooden house as it will make the house terribly hot. The best house of all is an "all metal" one.

A serious objection to mud walls is that they are convenient for rats to make holes in and for snake to lodge in, and invariably harbour ticks.

The house ought always to open to the south. During cold nights the house should be closed on the north, east and west, opening only on the south. During the hot weather and rains the west and east should be kept open also.

The side of the house will, of course, depend on the number of fowls to be kept. It is advisable to have several small houses rather than one large one, as in case of an epidemic breaking out, the only chance of saving at least part of the stock is to be able to prevent any communication between the different sets of birds. No house for the amateur poultry-keeper should be more than twenty feet long and six feet wide or ten feet by twelve feet and six to eight feet in

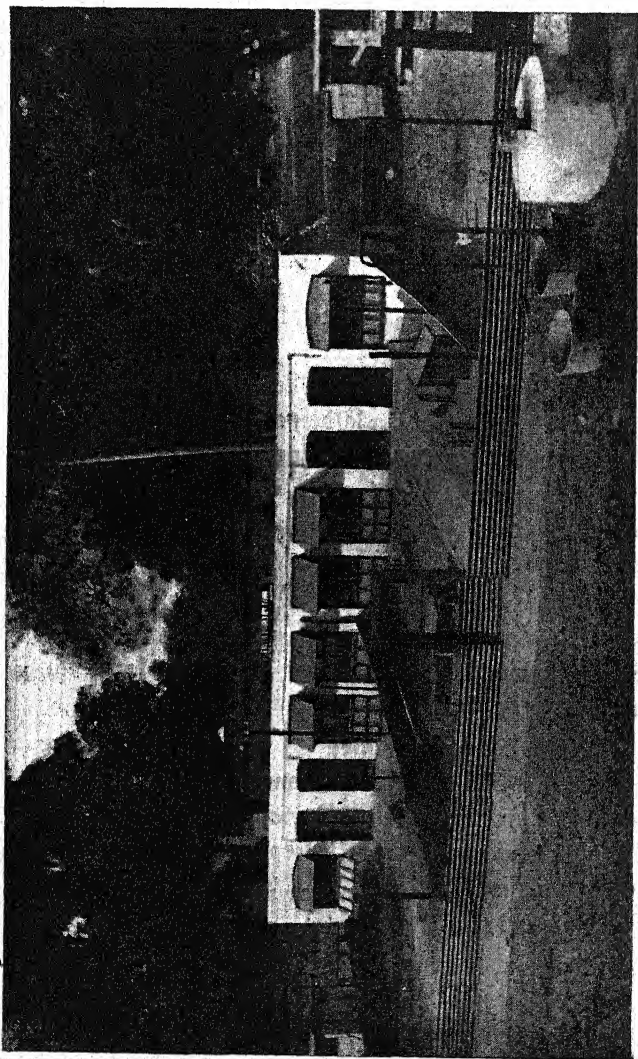


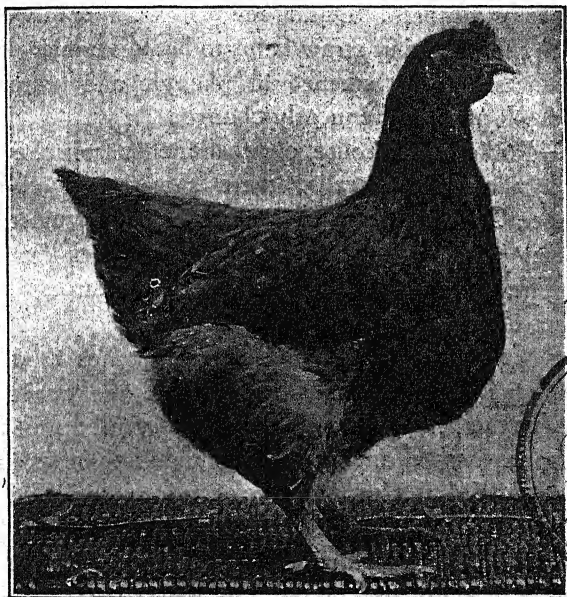
Fig. 2.—MODEL POULTRY-HOUSE AND RUN FOR INDIA.

The glass windows are fastened up at night, or in wet weather. There is a small door between each house and scratching shed, to allow the birds to go in to lay. Windows on the south and north cause a current of air and ensure a cool house. Care must be taken to make these high enough from the ground, so that the birds will not be directly in the draught at night. The glass windows must be closed in wet or very cold weather. A tube well supplies good pure water.

height. This will hold thirty fowls. Those keeping poultry on a commercial scale need, of course, larger houses.

Roof—The roof of the house may be made of either corrugated iron sheets, *pucca* work, thatch or wood. Other materials also give good service such as Malthoid Roofing, Italit, etc. Italit is the most convenient as it does not need another roof to support it. There should be no open space between the roof and walls for cats, rats or snakes to get in by. If corrugated iron is used for roofing, a good layer of thatch or mortar could be put over it to keep the house cool.

Ventilation—If built of brick the south side of the house ought to be enclosed with half-inch mesh wire-netting; on



RHODE ISLAND RED PULLET.

FIG. 3.

the north, east and west, high up near the roof, there should be some opening, twelve inches by six inches covered with

the same kind of wire-netting. This will afford perfect ventilation at all seasons and the house will not be too warm in the hot or too cold in the cold season.

Door—The door of the house ought to be on the south and made of an angle iron frame covered with half-inch mesh wire-netting. The size of the door should be in proportion to the house, but always large enough to allow a man to conveniently get through.

Floor—The floor of the house ought always to be *pucca*, well beaten down and plastered or cemented. On the floor there should be coarse sand or dry earth put at least three inches deep. Phenyle or kerosene oil should be frequently sprinkled on the sand and earth. The droppings on the sand must be removed every morning and the sand changed every three weeks or a month. During the cold weather straw may be used on the floor, but straw helps to breed vermin. Before being used it should be steeped in phenyle and water and well dried. It must be frequently changed.

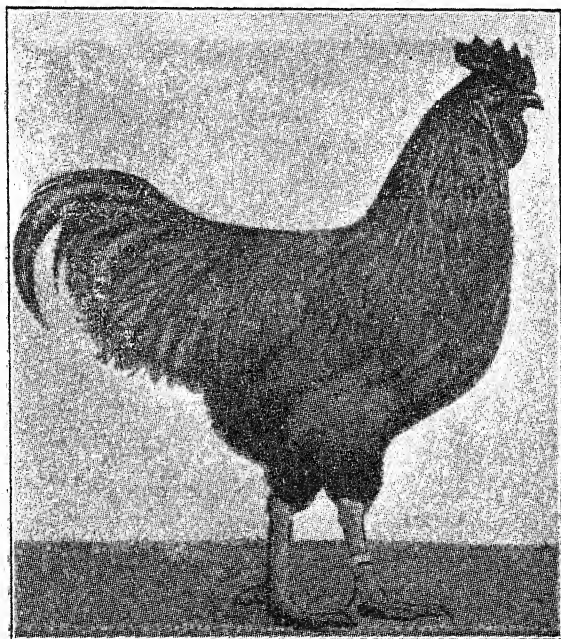
Perch—Inside of the house, eighteen inches from the wall, running parallel to the walls, there should be tick-proof perches, (see Chapter XVI) (to protect the birds against their worst enemy—the tick) twelve or eighteen inches from the ground. The perches should be made of good strong wood, three inches in width, rounded off at the edges.

Laying Nests—Earthen *gumlas*, eighteen inches in diameter and nine inches deep, should be placed in the corners of the house for the hens to lay in. One *gumla* will do for three hens. Dry ashes, sand or sifted earth should be put six inches deep in the *gumla*. Unless laying nests are provided, the hens will lay on the ground or in some place where the eggs are apt to get broken or be stolen. By using a *gumla* and ashes instead of a box and straw you will prevent vermin. Put some flowers of sulphur or tobacco leaf-stock with the ashes.

Shed—During the rains, fowls will not thrive if they are confined entirely to the house, or allowed to constantly walk

about in the wet and damp. A shed must be attached to the house, the east and west sides closed up with wire-netting, the north leading into the house, and the south enclosed with wire-netting and a door in the centre.

If desired, the shed may be placed to the east or west in a line with the house. The roof of the shed should be either corrugated iron sheets, *pucca*, wood or thatch, attached to the house and sloped down to the south or west. The floor of the shed may be plain mud, covered over with a good three inches of fine gravel or broken bricks and old plaster=



RHODE ISLAND RED COCKEREL.

FIG. 4.

ing. The door of the shed on the south ought to open into the yard.

The gravel on the shed floor must be changed every month

or two, and the earth dug up a foot or two deep and turned over once in six months.

On the floor of the shed put several inches of good scratching litter. Feed the grain into this litter regularly, as by scratching for their food in this way, the fowls will get the exercise that they need to make them lay, and keep them healthy.

Cut straw (*bhoosa*) makes a good scratching litter. Dry leaves are also good and are easily obtained. The litter should never be less than four inches deep and six inches is better.

Dust Bath—A *gumla* or a hole in the ground two feet in diameter should be filled with dry, clean, sifted earth or ashes and placed in the shed on the east side. This *gumla* should be continually refilled. Flowers of sulphur should be added to the ashes, also some dry coarse tobacco leaves. Coal ashes or cowdung cake ashes should be used.

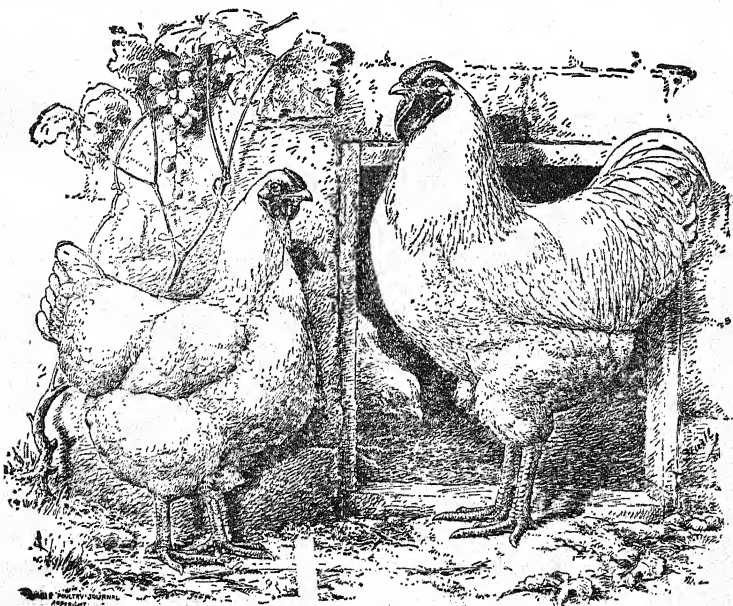
Lime—A small *gumla* filled with broken old sand plastering, old lime and mortar, or pounded bricks, slaked lime and flint grit, should be placed in the shed on the west side.

Instead of this, a box or *gumla* of coarse shell grit can be kept in the house or shed. This supplies the necessary grit, and the lime that is so essential to the formation of the egg shell.

Yard—The yard should be enclosed with one-and-a-half or two-inch mesh wire-netting. The height of the fencing will depend on the size and breed of the fowls. The Brahma, Langshan, Plymouth Rock, Orpington and Cochin and other heavy breeds, will need fences only five feet high, Game, Wyandotte and Chittagong six feet high, and smaller breeds from six to ten feet. It is preferable to make the fence only six feet high and cover the top of the enclosure with two-inch mesh wire-netting but this is rather expensive. There ought to be plenty of green grass on the yard. Every six months at least, half the ground in the yard should be properly dug up and turned over, and some kind of grain, such as wheat, mustard, sunflower, etc., sown on it. The best time

to dig up the yard is after the rains. If done before the rains, the ground must be well raised and properly beaten down, or else it will become soft and retain water. When only one breed is kept, and there is a wall or fence around the compound of the house, there is no need for an enclosed run. The fowls may be allowed the freedom of the compound. Fowls thrive well and lay better when allowed a free and large range. Hens allowed perfect liberty lay more eggs than do hens confined in small runs. The eggs of fowls on free range hatch better than do eggs of fowls confined in small runs. These facts should always be borne in mind when making a poultry-yard.

Never allow decayed vegetable matter, cowdung, horse-dung, etc., to remain in the poultry-yard. Dirt and filth of any kind are a fruitful source of disease and will work havoc among the poultry. No decomposed matter or excrements



WHITE WYANDOTTES.

FIG. 5.

of any kind should be allowed to remain where the poultry are.

Light—Light is just as essential to the wellbeing of poultry as is fresh air. The fowl-house must never be built in a dark, gloomy corner, or on the north or east side of another building. Plenty of sunshine is absolutely necessary. Without it, fowls will take cold, become mopeish, and die.

Water Vessels—A vessel with clean and fresh water ought to be placed in the yard or near the shed door. Always keep the water in the shade. If allowed to remain in the sun, it will become hot and will prove injurious to the birds.

Trap-Door—A small trap-door, twelve inches high and ten inches wide, should be attached to the door of the fowl-house. The door can be kept locked, but the trap-door must be left open during the day to allow the hens access to the laying nests. The door of the shed opening into the yard should be kept partly open during the day when the weather is fair. One has to guard against servants and crows, and also dogs and rats, stealing eggs from the nest.

For people who have not the means or room to make a proper fowl-house, the following method can be adopted. Make a box six feet long, four feet wide and four feet high, enclosed on four sides with board, the top and front being covered with half-inch mesh wire-netting. The top must be fixed with hinges to lift like the lid of a box. The front must have a door about a foot square, made of wood and wire-netting, to let the birds in and out. In the centre, six inches from the bottom, a tick-proof perch must be run, from the back of the box to within a foot from the front.

This box is placed in a shed, or back verandah. It holds a cock and four to six hens and is quite safe from cats, rats and jackals.

The box must be kept very clean and have a good layer of sand or earth on the wooden bottom. It must be swept every day, and the box and perch frequently painted with a mixture of kerosene oil and tar.

Beware of ticks with this kind of a house.

The fowls are kept in the box at night and let out in the compound or yard during the day. An earthen *gumla* filled with ashes is placed in one corner of the box during the day for the birds to lay in, and the small door is kept open to allow them to get in.

Cleanliness—Cleanliness is an absolute necessity. The house and shed must be swept every day, and every particle of the droppings removed. The yard, also, must be kept thoroughly clean, and nothing offensive allowed to remain.

The water vessels must be thoroughly scrubbed daily and the water changed twice a day.

At all seasons of the year, and especially during the rains, vermin breed rapidly in a fowl-house. The *gumlas*, perches and all the woodwork must be frequently cleaned and painted over with a mixture of kerosene oil and tar or washed with a strong solution of phenyle.

The sand on the floor of the house and the gravel on the shed floor must be changed as directed above. The ground in the shed and yard should be dug up and turned over twice a year.

The food and water must be good and clean.

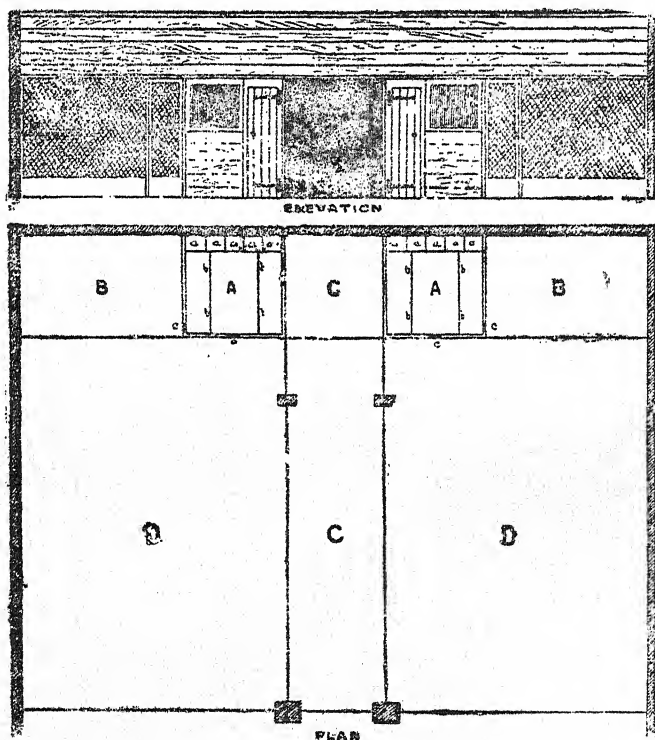
The walls inside of the house and shed should be painted with kerosene oil or whitewashed with quick-lime and carbolic acid every two or three months.

Rats—Rats are a great nuisance in a fowl-house. If they are allowed to get into the house, they will cause irreparable damage. They have been known to steal eggs and chickens, and kill fowls four or six months old. Besides that, they carry disease into a fowl-house. If the walls and flooring of the house is made of good *pucca* bricks and concrete, the rats will not give much trouble, but there is no way of keeping them out of a house made of mud or mats (the writer does not recommend such houses), unless the following plan is adopted: Lay down half-inch mesh wire-netting on the floor and run the wire-netting up the sides of the wall for

about three feet. Over the wire-netting on the floor place four inches of dry sifted earth or sand, and put some cowdung and earth-plaster over the wire-netting on the sides of the wall. By this means, rats can be most effectually kept out of the house.

Another good way of making a rat-proof flooring is this: dig up the earth to a depth of twelve inches, remove all the

PLAN OF POULTRY-HOUSE AND SHED



SCALE.

FIG. 6.

A A Roosting and laying-houses (10' x 10').

B B Fenced-in covered shed (10' x 20')

C C Shed and run for sitting-hens.

D D Grass runs. (For 30 fowls, 100' x 30').

a a Nests.

b b Perches.

c c Trap-doors.

earth and fill in the space to a depth of six inches with sand or coal cinders, pour in a lot of water and ram it down. Over the sand or cinders, put broken stone or rock and mix with pitch or asphalt, and ram down until you get a firm smooth surface. No rat will get through this. The stone or rock should be broken into pieces not larger than two-and-a-half inches in diameter.

Broken glass can also be spread on the floor of the house before putting down the broken brick to make a *pucca* floor. This is most effective, as no rat can possibly burrow through glass that cuts its nose.

It is no use trying to get rid of rats by poisoning them. The fowls will get at the poisoned food or dead rats and insects, and die from the effects. The best thing is to catch the rats in traps and drown them.

Snakes—Another enemy to guard against is the snake. Snakes get into the fowl-house through the rats' holes. A cobra in a fowl-house will kill half a dozen fowls in a few minutes and perhaps cause a loss of hundreds of rupees. The only way to keep snakes out of the house is to keep out the rats. It is easy enough to keep rats and snakes out of the fowl-house, but it is almost impossible to keep the runs and yards free from them. If large snakes get into the run and the fowls attack them, the snakes will turn on the fowls and bite them. As a rule, fowls will not attack large snakes, but will kill and eat small snakes. If the little snake happens to be a cobra, *kerait* or Russel's viper and bites the fowl, the bird will die. A fine large game hen was found dead near the door of her house. On examination it was discovered that she had been bitten by a snake. Her crop was very distended, and on being opened a cobra thirteen inches long was found in it. She had attacked the cobra, killed and swallowed it, but the cobra had bitten her in the fight. The only way to keep snakes out of a run or yard is to constantly fill up the holes in the runs and clear away all the jungle and long grass. If some coal tar is poured into the holes and the

mouth of the holes closed with bricks, rats and snakes will not get into them.

Hot Weather Tips—It pays to keep poultry comfortable in hot weather. Many birds die from heat prostration. In the hot weather profits are reduced and frequently there are severe losses due to the heat.

Hot weather results in less feed consumption, poor growth, poor fleshing, lower egg production, size and quality. Therefore, try to keep the birds as cool as possible.

What can be done to give relief from the heat ?

1. Use roof ventilators to remove hot air.
2. Paint roofs white to reflect the heat.
3. Place a thick layer of mud on the roof or thick thatch.
4. Increase the number of water vessels. Fowls drink up four times as much water in hot weather as they normally do.
5. Allow plenty of floor space. Don't overcrowd. Use about 4 square feet of floor space per fowl.
6. Provide plenty of dense low growing shade in the runs or yards.
7. Use wet mash rather than dry.
8. Spraying water directly on the fowls and chickens during severe heat is effective in minimizing death loss due to heat prostration.

CHAPTER IV

FOOD

The fowls' food is one of the things that need the most careful attention. Any neglect or mistake in this matter is sure to cause serious loss.

Quality of Food—The quality of the food must be the best. It is no economy to feed on damaged grain and meal, or rotten meat, potatoes and vegetables. Bad food will endanger disease.

Of all grain, wheat is certainly the best for poultry.

The grain, whole or coarsely ground, and the coarse *atta* and bran, are most excellent food for both young and full-grown fowls.

Barley is also good, but fowls in India do not readily eat the whole grain. It should be ground into meal and mixed with wheat meal and skimmed-milk or butter-milk. Sprouted barley is also very good and very palatable.

Oats, beans, peas and gram are all very good for poultry.

These grains should be crushed before they are given. The oats should be steeped and properly hulled before they are given to the birds.

Indian-corn (makka) is very fattening and must not be given exclusively, or very often to poultry kept for breeding, or to growing birds, but it is very good for fattening fowls.

Rice has the least value of all grain. It has only seven per cent of flesh-forming substance and a mere trace of bone-making substance. It must not be given to young and growing birds or to breeding stock, except in small quantities during hot weather, and then alternated with wheat, barley or oats. Paddy is very much better than rice and is good for the birds in the hot weather.

Boiled rice is good for sick fowls and weak chickens.

Skimmed-milk, butter-milk and curds (dahi) are excellent for fowls and should be given mixed with ground wheat and barley.

It has long been known that butter-milk is one of the best drinks for invalids and in fact for the average person. But very many who are interested in poultry never seem to realise its value as a drink or food for poultry. Butter-milk contains about the proper amount of lactic acid necessary to induce perfect digestion. It may also take the place of meat to a great extent. It keeps the fowls in a laxative condition, and at the same time, furnishes considerable valuable, readily digested food. In preference, give it to them in vessels, but if soft food is given them, butter-milk may be used instead of water to mix it with. The fowls are very fond of it, and it has proved as valuable for the hens to induce egg-laying as for the chicks which are making flesh, bone, muscle and feathers at one and the same time and which need a varied diet of the most nourishing foods. It makes the fowls plump and the flesh light coloured, tender and juicy. As it has proved to be such a great aid to digestion, it is not more than could be expected that fowls which have access to butter-milk are less subject to cholera or diarrhoea. This has through years of experience proved to be so.

Skimmed-milk is an excellent food and drink for young chicks, and it may be given them freely at all hours. The only thing necessary is that the vessels in which it is supplied should be kept clean by frequent scouring.

Potatoes are good for fattening fowls, but should be given very sparingly to laying hens. When given to laying hens or growing stock, potatoes should be thoroughly boiled in their skins, then properly mashed and mixed with equal part of wheat-bran.

Fowls need some animal food to supply the waste in their system. Meat of sorts should be given daily. Fresh bones, ground finely and mixed with meal, can be given as a

substitute for meat. The soup bones chopped up are good. All refuse food such as scraps of meat, bread=crusts, potatoes, vegetable, rice, *dall*, curry etc., from the table and kitchen should be gathered together, cut up fine and given to poultry.

Green-food is an absolute necessity. Fresh tender grass, onions, garlic, cabbage, lettuce, lucerne (alfalfa) are excellent. Nothing tends more to keep fowls in health and good condition. The lack of it will injuriously affect the birds and cause the eggs to be poor in quality.

Raw vegetables (chopped fine) are palatable and very good. They provide vitamins and mineral salts. Turnips, carrots, pumpkins, onions, beetroot, radish are all good. Boiled vegetables usually form part of the moist mash. But, if raw vegetables can be given along with green-food at noon, it will help to keep the fowls healthy.

All green-food should be given uncooked. It can be cut up very finely and mixed with bran and *atta* to form a mash, or it can be placed in racks made of wood or tin for the birds to pick at. Cabbages and lettuces can be hung from the roof by a string, just high enough from the ground for the birds to jump for. About 2½ feet is a good height.

Hemp seed, mustard seed and linseed given occasionally in small quantities during the cold season, rains and moulting time are very beneficial, especially to growing birds.

Never feed poultry entirely on paddy and rice or they will not thrive. If large well-grown birds are wanted, they must not be fed, only, on such food. It may be given to Bantams when the object is diminutive size. The village *moorgi* has nothing better than paddy, and that is one of the reasons why they are so inferior in size. If paddy is used as an article of food, it should be alternated with good sound wheat, gram and animal food. Every second meal should be wheat or gram, and some meat should be given daily.

Change of Food—The food needs to be changed at the seasons of the year. During the cold weather fowls need

more heat-producing and stimulating food, such as barley, oats, gram, peas, meat, etc. During the hot weather the birds need cooling food, such as wheat, paddy, butter-milk, and plenty of vegetables. It is best to give very little meat during the hot weather. During the rains, from the end of June to the end of September, especially when the birds are in moult, they need to be very carefully fed. Wheat, paddy, barley, gram, a small quantity of meat, onions and some tonic in the food or water should be given, and plenty of vegetables.

Quantity of Food.—It is no economy to starve poultry. They need an ample and regular supply of adequate food. It is also injurious to overfeed them. Overfed fowls are subject to many diseases from which properly fed ones are free, cease to lay before the proper time, or are attacked by apoplexy on the nest.

It is difficult to give a fixed scale of food. Cochins will eat twice as much as many other breeds, and different birds of the same breed often have very different capacities for food. The same hen will eat nearly twice as much when laying as when she is not laying.

The one simple rule with adult birds is to give them as much as they will eat eagerly, and no more. Food must never be left about. If food is allowed to lie about, a great deal will be eaten in excess, and a great deal will never be eaten at all. Sour or dirty food will endanger disease.

The quantity of grain allowed for each fowl will depend upon the extent of the yard and the quantity of scraps it receives from the kitchen and table, and also upon the season of the year. If the grass run is a large one, the fowls will forage for themselves and pick up a great deal of food. If the grass run is extensive, and there is a fair quantity of refuse food, then each fowl will need on an average one chittack or two ounces of additional food every day. If the run is small, and there is not sufficient scraps, then three chittacks.

or six ounces will be needed. They will not thrive on less, and more will be injurious.

Then, again, the different breeds will need different quantities of food. The Cochin will eat twice as much as the Orpington or Wyandotte. The Cochin and Brahma need more than the other breeds.

Watch your birds. If they are not hungry at feeding time, they are getting too much to eat. If you find good grain lying about in the scratching litter, feed a little less, until they are able to eat it all. Give at least half the food as grain and make them scratch for it. The other half can be given in the form of table scraps, wet mash or dry mash. The latter is the easiest form of feeding and has this advantage—being dry, the birds must drink after every few mouthfuls and so are prevented from overfeeding, if the water is placed a little way from the dry feed hopper.

Frequency and regularity of feeding—Fowls ought to be let out of their houses into the yard a little before sunrise unless the grass is wet, as they enjoy the cool fresh morning air. On being let out, the first thing they will do is to drink water. Fifteen minutes after they are let out, they should be given their morning food.

This should consist of one ounce for each fowl of good sound grain raked into the scratching litter. Three hours later, the dry-feed hopper should be filled and the birds will peck and feed at it during the day. If preferred, a wet mash can be fed at this time, about two ounces per bird. Another feed of grain, similar to the morning feed should be given a little before sunset.

If more convenient, the two ounces of grain can be fed in the morning and the wet mash in the evening. Some might prefer to give the mash in the morning and the grain before the birds go to roost. Either of these three methods can be adopted, as all have proved successful. The main thing to remember is to be regular. The birds soon learn when to

expect their meals and are ready for them, if they are in good health and are not over-fed.

Preparation of Food and mode of feeding—The grain fed to the fowls can be varied from day to day, or it can be mixed and fed in that way.

Wheat as stated before, is by far the best grain for fowls, but is inclined to fatten them if fed exclusively. Broken gram, maize, oats or barley should be used with it. The great millet, sorghum (*juar*) is also good. A little paddy is beneficial at all times.

Thirty seers of wheat, ten seers each of paddy and broken gram and five seers each of *juar* and broken maize make a very good mixed grain for fowls. Oats or barley may be substituted for the gram or maize, if these are not obtainable. This mixture can be varied according to the time of the year. In hot weather, a little more paddy and less gram and maize is advisable. Coarse oyster-shell grit can be added to this in the proportion of five seers to every maund of grain. The grit can also be kept in boxes or tins where the fowls can help themselves as they wish.

The mash should be composed of good wheat bran and *atta*—preferably half of each with a little linseed added. Pea-flour and gram-flour can also be added in small quantities. Fish-meal should be mixed with this about five seers to every maund of mash. This supplies the necessary meat for the birds and, being easily assimilated, is not so likely to cause indigestion. Fish-meal is becoming more known and more popular as a food for fowls. It is easily obtainable, easily kept, and easily given. It provides the birds with a good nourishing food and increases the egg-production. Chickens thrive on it also but it is better to start with only about half the quantity for them. This can be increased gradually until the birds have reached maturity. A little freshly-made powdered charcoal added to the food is very beneficial to both chickens and adult fowls.

If the above mash is to be given wet, only enough milk or

water should be added to make it crumbly. Mix it well with the fingers until the moisture is evenly distributed and the mixture can be pressed into a ball with the hands, breaking into crumbs when dropped again. Wet food is positively injurious to fowls. If it has become too wet, dry it off with a little wheat bran until of the right consistency.

Boiled carrots, turnips, pumpkins and beetroot or chopped lettuce and cabbage can be mixed with the wet mash. Onions and garlic can also be chopped fine and added. Fowls like a little salt in their food, but care must be taken not to give them too much. Dissolve the salt in water and mix well into the



PAIR OF BUFF LANGSHANS.

FIG. 7.

food. One teaspoonful of salt is sufficient for thirty or forty adult fowls.

The mash should be placed in shallow dishes. These should not be allowed to remain in the run or shed for more than forty minutes. If the fowls have not eaten the food by that time, feed a little less next day.

The dishes should be washed as soon as they are taken up and put away for the next day.

Water—Fowls are thirsty creatures and should be given plenty of pure drinking water. The water vessels must be scrubbed overnight and kept near the shed door ready for use in the morning. Early in the morning before the fowls are let out, the vessels must be filled with water. The water must be changed again at 4 p. m. A few drops of Condyl's fluid, E. C. Milton, or Douglas' mixture should be added to the water. Never leave the water in the sun.

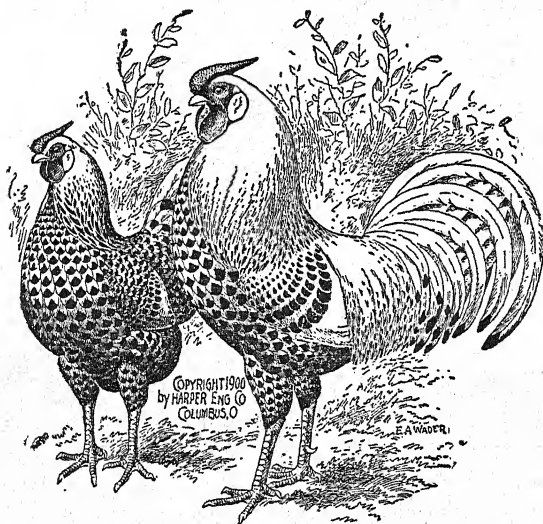
Lime—Lime is a necessary article of food for fowls. It supplies the substance for the egg shells. If fowls are not allowed sufficient lime, they will not thrive and will lay soft-shelled eggs. The lime must be slaked and mixed with sand or pounded brick and placed in a box in the shed. Old lime plastering will do very well. Oyster-shell grit supplies both lime and grit for the fowls and is to be highly recommended.

Sharp Grit—Sharp grit is absolutely necessary to the health of the fowl. A constant supply should be kept in the run near the feeding trough. The grit must be sharp. Blunt edged grit will be of no use. If unobtainable, break up some old crockery, flint or rock with a hammer and pass the small pieces through a sieve. The sieve must be of one-eighth inch mesh. All that passes through this sieve will do well for the birds.

Care of Cock Birds—It sometime happens that unless the cock birds are given extra food a great percentage of the eggs are infertile. To place a box or cage in the pen, put the male bird in it and feed him separately with extra food, is only a few minutes' work. Another way is to feed the hens in the shed, but leave the cock by himself in the house and feed him there. Care should be taken not to get him too fat.

Cost of Food—The cost of feeding fowls varies much according to locality, management, and the price of grain. Never allow the food to be wasted. Buy good food and do not try to keep it too long. It will go mouldy and you will be obliged to throw it away.

If you trust your servants with the feeding of the fowls, either the food will cost about twice as much as it otherwise would, or the fowls will be starved. Personal care goes a great way in reducing the cost of keeping poultry.



PAIR OF SILVER-SPANGLED HAMBURGS.

FIG. 8.

Housing—The following article by "A Practical Poultryman" about housing and feeding poultry will be of interest to all beginners :

"The next question relates to the housing of poultry. Birds do not need warmth as much as air.

"Healthy hens will maintain better health when roosting in the trees in the most severe weather of winter than in faulty houses. It has been sometimes stated that the heat of the hen-house in winter is followed by the production of a larger

number of eggs, if such has been the case, we are quite satisfied that in the main, the hens suffer in health.

"The hen-house should be built facing the south and so arranged that it catches the morning sun.

"Light appears to be contrary to the ideas of the old-fashioned poultry-keeper, whereas it is the enemy of disease, and specially of deadly microbic life. A perfect poultry-house should have no wooden floor, but a floor of earth laid upon at least eight to ten inches of cinders, broken bricks and gravel, and covered with a layer of sand, which will facilitate the daily removal of the manure with the broom. Cleanliness should be the first consideration. The house should be well ventilated but not draughty, and the door should be of wire-netting; care being taken to prevent the birds from being in a draught. It may be well whitewashed without and within; lime-wash being used at least every month chiefly to keep down parasites."

Feeding—The greatest mistake made in feeding is that too much grain is usually fed, and not enough animal and vegetable food. It must be remembered that the "jungle fowl," from which all breeds and varieties of poultry have been evolved, finds very little grain in the forests. Its food consists mostly of insects and green growing shoots, the only grain usually being some weed seeds. The following method of feeding fowls has been practised on the Mission Poultry Farm, Etah, U. P. for 40 years and is cheap and has given satisfaction. If meat offal is not available or if one has principles against using meat, the animal food so necessary can be given in the form of sour milk, dahi, or butter-milk. Both are very good. If heavy egg production is looked for, some form of animal food must be given to provide the protein, as eggs are rich in this.

FEEDING METHOD USED ON THE MISSION POULTRY FARM, ETAH, U. P.

"In the morning a feed of grain composed of wheat (gehun), maize (makka), and great millet (juar), about equal

proportions of each, one handful to each fowl, i.e. about 2 oz. If the birds are not on free range in order to induce exercise the grains should be scattered in a litter of dried leaves, dried grass or Bhoosa etc. about 6 inches in depth to keep them scratching for it.

"At noon they get all the green food they can eat which in the winter consists of such things as cabbage leaves, cauliflower leaves, chopped lucerne etc., or whatever is available from the vegetable garden. Doob grass if available is also very good. They will usually eat about 2 oz. each of green food.

"In the evening I give a moist mash, all they can eat which will again be about 2 oz. for each fowl. The mash is made up as follows :

1/3rd cooked minced meat. I buy from the slaughter house offal (paunches, lights etc.). This is a non-stimulating white meat, and very nutritious and can easily be bought for -2/- per seer. 1/3rd of cooked vegetables using whatever is available. Pumpkins, turnips and onions etc. are all good. I use whatever is in season and easily procurable. 1/3rd of atta consisting of a mixture of wheat atta and bejhar ka atta (barley and peas) in about equal proportions. The cooked minced meat, cooked vegetables and atta should all be thoroughly mixed and fed in a moist and crumbly condition, i.e. not sloppy. A little practice will enable one to know how much water to use. *The same water in which the meat and vegetables are cooked in is the best to use as it contains mineral salts."*

A cheap ration recommended by Mr. A. J. Macdonald, Ex-Poultry Research Officer, Indian Veterinary Research Institute, Izatnagar, U. P. is given below :

"I consider that the mash and grain system of feeding is the best for this purpose. Good results would be obtained with the following mash :

Maize meal	..... 20 parts
Wheat bran	..... 40 "

Ground oats	.....	20 parts
Earthnut meal (ground nut)	20	"
Common salt	.....	1 part

"The grain fed should consist of equal parts of broken maize, wheat and paddy. You should also feed ample amounts of green food and calcium."

STANDARD RATIONS FOR CHICKS AND FOWLS,
RECOMMENDED BY POULTRY RESEARCH
SECTION, INDIAN VETERINARY RESEARCH
INSTITUTE, IZATNAGAR

Dry Mash

Wheat bran	.....	50 parts
Yellow maize meal	.....	30 "
Ground oats	.....	20 "
Salt	.....	$\frac{1}{2}$ "

Grain 0-8 weeks

Yellow maize grits	.....	1 part
Bajra, Chena or Cheena		
(Small millet)	.....	1 part
Jowar (Great millet or		
Sorghum)	.....	1 part

Grain 8 week onwards

Yellow maize	.....	1 part
Paddy	.....	1 "
Wheat	.....	1 "

The dry mash is fed *ad libitum* from day-old onward in suitably designed hoppers. The grain is fed several times daily during the first week but thereafter it is only fed according to appetite in the morning and evening. Liberal amounts of cut, fresh green food, and broken limestone *ad libitum* are fed at all stages.

From 0-6 weeks separated milk only is given to drink (no water). From 6 weeks onward separated milk and water in separate containers are fed.

The laying stock receive the same rations as the growing chicks.

If separated milk is scarce or expensive, similar results can be obtained with good quality butter-milk.

When separated milk or butter-milk are expensive, good results can be obtained by substituting meat offals (intestines of animals from the slaughter house).

The meat offals should be cut up fine or run through a mincing machine and cooked for a period of 1 hour before use.

For young chicks (0-8 weeks) one pound of meat offal should be fed for every two pounds of mash and grain. From 8 weeks onward, good results can be obtained with one pound of meat offals to every three pounds of mash and grain.

The following system of meat offal feeding has given good results with chickens:

7:00	A. M.	.....	Grain
8:30	A. M.	.....	Wet mash
11:30	A. M.	.....	Wet mash
2:30	P. M.	.....	Wet mash
5:00	P. M.	.....	Grain

As the birds grow older the number of wet mash feeds can be reduced to one per day.

With adult hens good results can be obtained by feeding the usual mash and grain rations along with 1 oz. of meat offal per bird per day.

The following feeding schedule and rations are being used on a South India Farm:

1. *Layers Rations*

Grains

Paddy (Dhan).....	7 parts
Cholam (juar or great millet).....	5 „
Ragi.....	2 „
Khambu (bajra or bull rush millet).....	2 „

Breeder's Mash

Wheat bran	4 parts
Rice bran	4 „
Gronnd cholam.....	1 part
Ground ragi	1 „
Groundnut cake	2 parts
Bone meal	2 „
Fish meal	1 „

Dry mash, charcoal, oyster shell, sand and clean water should always be available.

6:00 A. M. 1 oz. grain per fowl. Chopped lucerne and greens.

11:00 A. M. Wet mash, made from above.

6:00 P. M. 1 oz. grain per fowl.

Each fowl gets 2 oz. grain and 2 oz. mash per day. Also all the greens they will clean up.

2. Baby Chicks

First 48 hours, they should have nothing but water and clean sand.

First week, Chicks should have hard boiled eggs including the shell and bread crumbs, small amounts of broken grain.

Up to 8 weeks of age:

1 part broken wheat)

1 „ „ rice) In covered hoppers

1 „ „ ragi) always available.

1 „ „ khambu)

$\frac{1}{2}$ oz. meat offal per chick.

Breeder's mash in open hoppers.

3. Growing Rations

Gradually increase size of grains.

Laying mash as per Breeder's mash is always before the birds.

The following Feeding Schedule and Rations has been

PULLET REPLACEMENT AND LAYING RATION

Ingredient and Protein Content	Starter 0-8 weeks 20%	Grower 8 weeks-Lay		Layer and Breeder		Cage Layer 16%
		16%	26%	16%	26%	
*Ground yellow corn	940	1,100	...	1,120	130	1,075
*Ground heavy oats	100	200	340	200	200	200
*Wheat middlings	200	200	400	200	400	200
**Dehydrated alfalfa meal (17%)	100	100	300	100	250	100
Soybean oil meal (44%)	500	300	800	300	800	300
Fish meal	50	...	...	50*	100*	50
Ground nut meal	40	...	...	...	...	...
Steamed bone meal (or equivalent)	40	50	100	60	140	40
Ground oyster shell	20	20	30	20	60	20
Iodized salt	9	10	25	9	25	5
Manganese sulfate	0.5	0.5	2	0.5	2	0.25
<i>Vitamin Additions</i>						
Vitamin A (million units)	4.0	2.0	6.0	4.0	8.0	5.0
Vitamin D ₃ (million units)	0.8	1.0	1.0	1.0	3.0	1.0
Riboflavin (grams)	2.0	2.0	3.0	4.0	10.0	4.0
Choline Chloride (grams)	400.0	200.0	400.0	...	...	200.0
Niacin (grams)	10.0	10.0	15.0	...	...	10.0
Pantethenic acid (grams)	4.0	4.0	6.0	...	...	4.0
Vitamin B ₁₂ (milligrams)	8.0	6.0	5.0	2*	4*	4.0
Antibiotic (Penicillin) (grams)	5.0	5.0	10.0	...	...	...
Total pounds approximately	2000.0	2000.0	2000.0	2000.0	2000.0	
<i>Calculated Analysis:</i>						
Productive energy (calories/pound)	900	885	630	920	615	940
Protein (%)	20.5	15.5	27.0	16.0	26.2	16.6
Fat (%)	3.6	4.7	3.8	4.0	3.6	4.3
Fiber (%)	4.3	4.7	8.8	4.8	7.6	4.8
Calcium (%)	1.45	1.35	2.8	1.6	3.6	1.6
Phosphorus (%)	0.78	0.77	1.3	0.86	1.5	0.85

* —Any one of these grains may be used alone

** —Can be left out for chickens on range or if fed greens

** —Needed only if hens are being kept for production of hatching eggs.

Prepared by STANLEY L. BALLOUN, Iowa Agricultural Experiment Station.

THE UNIVERSITY OF CHICAGO
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DEPARTMENT OF CHEMISTRY

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worked out by Mr. S. L. Balloun, Professor of Poultry Nutrition, Iowa State University, Ames, Iowa, U. S. A.

It has been adapted to suit Indian conditions. Meat products have been eliminated, although fish meal has been included. The cheapest of the antibiotics, penicillin, has been added. If procurable, it should be used at the rate of about five grams per ton in the feed for the young chickens. There is no need to include it in the feed for mature hens.

I am sure that this up-to-date ration formulae carefully worked out by an eminent nutrition expert will prove to be valuable for use on large commercial farms or on government poultry farms. I am happy to be able to include it in this enlarged revised edition. Our warm thanks go to Prof. S. L. Balloun for his timely help.

SUGGESTION FOR FEEDING

Using Pullet Replacement and Laying Rations above

Chick Starter—This ration is designed for replacement pullet chicks until they are 8-weeks of age. It should be the only feed provided during the 8-week period. Provide 1 to 2 linear inches of feeder space per chick. At least two 1 gallon waterers should be provided up to 3 weeks and at least two 3 gallon waterers or equivalent per 100 birds from 3 to 8 weeks.

All-Mash Pullet Grower—Feed this ration as the only feed from 8 weeks to sexual maturity. If *good green pasture* is available to the birds during the growing period, this ration can be simplified by omitting the alfalfa meal and vitamin concentrates. Provide 3 linear inches of feeder space for each bird and one waterer of 5 gallons capacity or one automatic trough or pan-type waterer per 100 birds.

Twenty-six percent Pullet Grower Supplement—This supplement is designed to be fed with whole grains on a free-choice basis. This method of feeding makes maximum use of home grown, whole grains.

Sixteen percent Layer and Breeder Ration—This ration should be fed as the only feed for egg production type chickens. No additional grains should be fed, but additional calcium must be provided. This calcium can be provided through the free-choice feeding of oyster shell, high calcium limestone or calcite grits. Feeder space equivalent to 4 linear inches per hen must be provided. One linear inch of waterer space per hen must be provided or one automatic trough or pan-type waterer per 100 birds.

Twenty-six percent Layer and Breeder Supplement—Laying hens fed this supplement should be given whole grain on a free-choice basis, and also a source of calcium, free-choice. Heavy-type layers may tend to consume too much grain on this system of feeding. Therefore, the free-choice system is suggested only for light-breed, eggproduction-type chickens.

Sixteen percent Cage Layer Ration—This ration is fortified with extra vitamins which are necessary for caged layers. Extra calcium should also be provided.

Grit—Insoluble grit of proper size should be available to birds of all ages when they are fed whole grains.

CHAPTER V

THE SELECTION OF BREEDS

There are many breeds of fowls. Some are beautiful ornamental birds, well worthy of the attention of fanciers who can afford to keep them for mere show. Some are both beautiful and useful birds and can be kept profitably by all people with ordinary care and economy. Some are very delicate birds and do not thrive in India, others, again, are hardy and not only thrive well but multiply rapidly.

Object in Keeping Poultry—The selection of the breeds to keep will depend entirely upon the object with which fowls are kept. Some persons keep fowls as mere ornaments and pets, others keep them for the benefit of the household and use the eggs and fowls for the table. Others, again, keep them to breed from and sell. The class of people first mentioned generally select the most showy and expensive birds. The second and the third classes of people mentioned would be wise if they combined their interests and kept only such fowls as will furnish ample produce for the consumption of the family as well as a surplus which can be readily sold at a profit to help to defray expenses incurred in the upkeep of the poultry.

Delicate Breeds—I will first mention some of the breeds that are very handsome, but are either too delicate for India or unproductive, and consequently not worth the while of people who desire profit from poultry-keeping. Such are the different varieties of white-faced Spanish fowls, all the varieties of crested Polish fowls, the Creve-coers. The Dorking is a splendid breed of fowls but extremely delicate and the hens are indifferent layers. The Houdan is a good general purpose fowl but will not thrive in all parts of India. The climate of Bengal, Assam, and the Duars, where the rainfall is heavy, is quite unsuited to this breed. They may thrive

better in the dry and nicer climate of the Punjab and the Central Provinces.

The Best Layers—The Australorp, Wyandotte, Rhode Island Red, The Orpington, Langshan, Rock, Sussex, Brahma, Chittagong, Cochin are the best layers among the larger breeds. The Leghorn, Minorca Andalusian, Ancona and Campine are the best layers among the smaller breeds.

All hens of the same breed do not lay alike. Some hens of the best laying breeds are the worst layers, and some hens of the worst laying breeds lay very well. Pure-bred birds of a good strain are capital layers. When the birds are bred from only the best layers, and this is done year after year after most careful selection, the good qualities are established in the birds and the strain is made.

The Largest And Most Weighty Birds—Brahma, Langshan, Orpington, Australorp, Rock, Chittagong, Wyandotte, Game, Cochin, Sussex, Rhode Island Red, New Hampshire.

The Most Hardy Birds—Brahma, Langshan, Chittagong, Australorp, Wyandotte, Rock, Orpington, Leghorn, Sussex, Cochin, Game, Rhode Island Red, New Hampshire.

The Best Table Fowls—Aseel or Game, Chittagong, Langshan, Wyandotte, Rock, Orpington, Sussex, Rhode Island Red, New Hampshire.

Eggs—Black Minorcas are famous as layers of very large white eggs. White Leghorns run them very close and are hardier. The Rhode Island Reds are excellent layers of large brown-shelled eggs and are very hardy. New Hampshire are also good layers.

Langshans, Game or Aseels, Plymouth Rocks, Brahmas, Cochins, Orpingtons, Rhode Island Reds, and Wyandottes lay the darkest shelled eggs, while the eggs of the Spanish and Polish varieties and Minorcas are the whitest of all. The eggs of the Bantam and Hamburg, though very small, are the nicest in flavour. A good sized egg should weigh from two to two-and-a-quarter ounces, or from five to six tolas.

Ordinary eggs weigh less than one-and-a-half ounces each. Two-ounce eggs are a good average.

All hens of the same breed will not lay eggs of the same colour or size. Some Brahmas, Plymouth Rocks, Wyandottes, and Orpingtons lay tinted eggs and some very dark eggs.

Non-Sitters—The Houdan, Leghorn, Hamburg, Minorca, Campine and Andalusian are non-sitters. When any of these breeds are kept, hens of some sitting breed or an incubator must be kept to hatch the chickens.

The Best Sitters And Mothers—Silkies, Wyandottes and some Bantams are the best sitters and mothers. The Brahma, Cochin, Rock, Orpington, and Langshan are excellent sitters and mothers, but they are very heavy and apt to be clumsy



PAIR OF ROSE-COMB BROWN LEGHORNS.

FIG. 9.

with their eggs and chickens and destroy many of them. Very large heavy hens should not be set. The game and Chittagong are splendid sitters and mothers, but they will kill all the other chickens, and wound all the hens in the yard if not carefully watched. The common country hen, called the

Pati, or "Desi", is, as a rule, the best mother of all fowls. She is not much larger than the Bantam, and is very vigilant and a grand forager. It must be borne in mind that all hens of the same breed are not equally good mothers. They differ in this as much as in laying qualities.

The Best Breeds To Keep—If the object of keeping fowls is only the pleasure of keeping and breeding them for home use and exhibition, the selection can be made from the following breeds: Brahma, Cochín, Langshan, Orpington, Rock, Wyandotte, Silkie, Hamburg, Bantams, and any other breed that takes the fancy. If, however, the object is to obtain a good supply of chickens for the table, as well as good birds for profitable sale, the selection should be made from the following breeds: Wyandotte, Langshan, Orpington, Rock, Sussex, Rhode Island Red, and Australorp. If the object is to obtain only a large supply of eggs and birds for profitable sale, then the selection should be made from the following: Wyandotte, Orpington, Langshan, Rhode Island Red, Rock Brahma, Australorp, Minorca, Leghorn, and Sussex.

For all purpose fowls, the following breeds cannot be beaten: Langshan, Orpington, Wyandotte, Chittagong, Rock, Brahma, Rhode Island Red, Australorp, Minorca, Leghorn, Sussex and new Hampshire.

Other Indian Breeds—There are breeds of fowls in India resembling the Leghorn and Hamburg in size and shape and of very fair laying qualities. They are of various colours. Another breed obtainable in India resembles the Sussex, Rock and Wyandotte in shape but are smaller and of different colours. They are fair layers. These fowls are found all over India, but especially in Bengal.

A Profitable Method—It costs no more to keep pure-bred birds than it costs to keep inferior ones. Pure-bred birds are much more satisfactory as layers and for the table and sell for more money. It is always best to keep the breeds pure and not cross them: but when this cannot be done, the following plan may be adopted: Keep a stock of pure-bred fowls

and some hens of other breeds, say one cock and two hens of a pure breed and two or four hens of another breed. Set the eggs of the hens of pure stock and raise the chickens to replenish the stock or sell. The eggs of the hens crossed by the pure-bred cock may be used for the table, or set and the chickens used for the table. This plan will insure keeping the main stock pure, and at the same time producing good eggs and fowls for the use of the household.

The pure-bred chickens will fetch good prices. The cross-breeds will also sell well for table use.

The Best Crosses—The following breeds crossed produce good table fowls and fair layers :

⟨1⟩ Langshan, Rock, Wyandotte, Orpington, Rhode Island Red, Brahma, Leghorn and Minorca hens crossed with the Indian Game or Chittagong cock produce good birds for the table and fair layers.

⟨2⟩ Indian Game and Chittagong hens crossed with a Langshan, Orpington, Wyandotte, Rhode Island Red or Brahma cock will produce good layers and table birds.

⟨3⟩ White or Barred Rock and White Wyandotte or White Orpington make a very good cross.

⟨4⟩ Black Langshan and Black Orpington and Dark Brahma are a good cross and also a Black Langshan cock with a Black Minorca hen for egg production.

⟨5⟩ Rhode Island Red and White Wyandotte or White Leghorn produce a good cross.

⟨6⟩ The Dorking or Sussex cock mated with Brahma or Cochin hens give good table birds.

⟨7⟩ The Rock cock and the Brahma hen produce very good table birds and fair layers.

⟨8⟩ The Dorking and Sussex mated with the Indian Game, the Chittagong or the Brahma produce very good table birds.

The above-mentioned are the best crosses that can be made. Promiscuous crossing will produce nothing but evil results. Cross-breeding is to be avoided as much as possible,

but when two pure breeds are to be mated together, the above-mentioned plan should be strictly followed.

When one breed is crossed with another breed, cocks and hens of the same colour, or as near the same colour as possible, should be selected. Hens with long legs should be mated to short-legged cocks, and hens with short legs should be mated to rather tall cocks. The birds should be as large and broad as possible and in perfect health.

The cross-bred cockerels should be used for the table when they are between three and four months old, and the best pullets should be kept for laying purposes. These pullets should be mated with pure-bred cocks of the same breed as their fathers. This process should be continued every year. The cross-bred hens should be killed for the table when they are between nineteen and twenty months old.

The way to improve the common country fowl—The country fowl can be greatly improved by crossing the best hens with the White Leghorn, Chittagong, Langshan, Orpington, Wyandotte, Minorca or Rhode Island Red cock. Select sixteen of the largest and best country hens you can get and let them run with two good pure-bred cocks of any of the above mentioned breeds. Then take sixteen of the best of these cross-bred pullets and put them with two cocks of the same breed as the father of the pullets. The next year take sixteen of the best pullets of the second cross and mate them to a couple of pure-bred cocks of the same breed as the previous cocks. This process may be repeated for about five years, and there will be a wonderful transformation and improvement in the fowls of the country. The writer specially recommends White Leghorn and Rhode Island Red cocks for crossing on country or "desi" fowls.

The best results are obtained from pure-bred cocks. The cross-bred cocks and cockerels should not be bred from. When cocks of the same pure breed are used in each successive cross, the results are much more satisfactory. In such a process as this the cost will be small. The price

POINTS OF THE LIGHT SUSSEX.



Don't use a male with a comb that falls away in front or does not follow the line of neck.



Faulty feather
Black outer edge.



The hackle feathers are entirely surrounded with white. B Feather with fault, Black tip.



All Sussex fowl have White Legs rather wide apart, being fairly stout.



The top feather may be edged.

A good type & marked hen with nice Black tail.

of two good cocks suited for the purpose will be within thirty rupees.

When selecting the pullets to breed from, only large bodied, well shaped, healthy birds that are also good layers should be chosen.

Poultry-Breeding in India—Of late years there has been a great advance in poultry-breeding all over the world. England, Scotland, Ireland, America, Canada, Australia, Germany, France, Belgium, Sweden, Denmark, and South Africa have all realised the fact that poultry raising is a very important industry and far more profitable than many other branches of agriculture. Not only have the poultry indigenous to the country been improved and their value as layers and table birds increased, but valuable birds from other countries have been imported and used to further improve the indigenous breeds, or kept pure and bred to produce the best results for laying and table purposes. The fancy side of poultry-breeding also has received a great impetus.

In India also there has been a decided awakening in favour of poultry-breeding, and a great many people among government officials, planters, railway employees and missionaries and also a number of Indian noblemen and gentlemen have taken a kindly interest in our feathered friends, and the prospects for the welfare of poultry in India are today brighter than they ever were before. Nevertheless, there is still a great deal of ignorance about the different breeds of fowls, and their economic value, and their proper breeding and care. We shall do our best to assist people to a proper knowledge of these things and help them to success.

In the first place, we will consider the value of the best breed of fowls found in India. There are really only two or three pure breeds of fowls indigenous to India. The first is the Chittagong breed, and the other is the Aseel, and in Western India the Busra fowl. There are a large number of fowls of different sizes, shapes and colours to be found all over India. These are for the most part very much like the

jungle fowl. Their size and shape vary according to the locality in which they have been raised and the care with which they have been bred. Some of them have Chittagong, Aseel, Langshan, Brahma or Orpington blood infused into them and are better in size and quality than the common ones.

The common Indian *moorgi*, as found in all parts of this country, is of very little value as a layer or table bird.

Those that have been produced by a cross with the Chittagong and Aseel are larger birds and find a good market in Calcutta and other cities and towns in India. A cross between the Chittagong cock and the common hen will produce very fair table birds, and a cross between the Langshan, Rhode Island Red, New Hampshire, Wyandotte or White Leghorn cock and the common hen will produce very fair layers.

A great deal can be done by government officials, planters, railway people, and missionaries to improve the common village fowl. In the first place, the village people must be persuaded to get rid of *all* their common cock birds and sell off all the common cockerels before the birds are three months old, and keep only the largest and best among their hens and pullets. Then, in the second place, large numbers of medium-sized white Leghorn, Minorca, Chittagong or Rhode Island Red cockerels, between 8 and 10 months old, must be distributed among the villages. Then, again, the next year all the cross-bred cockerels and cocks and the common hens must be removed, and only the best cross-bred pullets allowed to remain. These cross-bred pullets should be allowed to run with the pure-bred Chittagong, White Leghorn, Minorca, or Rhode Island Red cocks. The third year all the cross-bred cockerels and the hens of the first cross should be removed and the best pullets of the second cross allowed to remain. These pullets must be allowed to run with a fresh lot of pure-bred Chittagong, Rhode Island Red, White Leghorn or Minorca cocks. Every second year the pure-bred cocks

should be changed and new ones put in their place. The cocks of one village can be put in another village a few miles away. By working on these lines, in five or six years the characteristics of the fowls in the village will be entirely changed. They will be large, hardy, and good layers of large eggs and will sell for more than double the money that could be gotten for the small common fowls. In six years, these improved fowls will be very much like pure-breeds in size and shape. The initial cost of working this plan is not much. It does not need money as much as work and perseverance. Fifty good Chittagong or Rhode Island Red or White Leghorn or Minorca cockerels put in one village will work a wonderful change in a few years, but it will be of very little use to put these cockerels in a village unless the common cocks and cockerels are first disposed of and all the cross-bred cockerels are removed as soon as they are three months old. If the common or cross-bred cocks are allowed to remain in the village, all the good work will be spoiled.

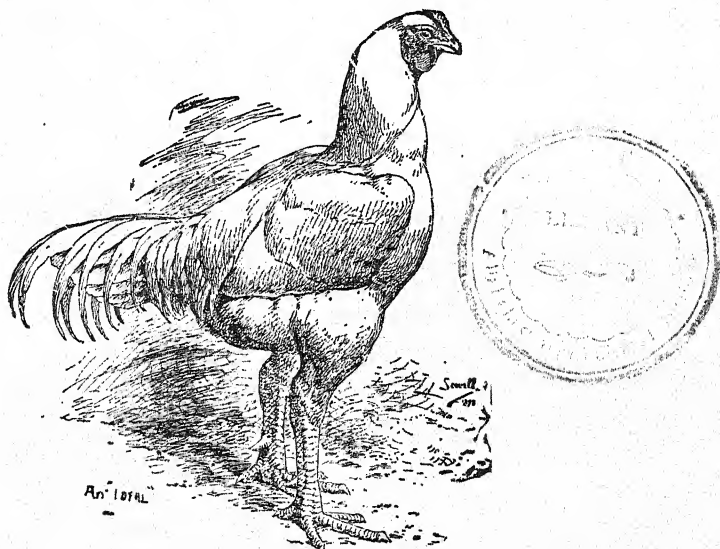
I advocate improving the village fowls by crossing with the Chittagong, Rhode Island Red, White Leghorn or Minorca cocks. For the European, Anglo-Indian and the better class of Indian, I would advise a different plan altogether. There is no need for them to waste time and energy in trying to improve the common fowl. They should keep only pure breeds, and try to perfect these pure breeds and produce the best layers and table birds. An intelligent person will succeed better with pure breeds than with cross-breeds, and he will attain his purpose, be that utility or fancy, better and quicker with the pure breeds.

The Number of Breeds to Keep—One breed to begin with is the best possible advice to any poultry fancier. Two hens of the same breed can be kept with advantage, as the chickens can be leg-banded to distinguish them and unrelated birds mated up each year.

If another breed is desired later, the necessary house and run must be provided before the birds are procured. Never

allow your cocks and hens to mix indiscriminately. Keep the different breeds apart at all times or you will not be able to guarantee the breed of your chickens. It is foolish to suggest that the different breeds of fowls will keep to themselves. *They will not.* The stronger cock of the lot will predominate and gradually the hens will gather around him.

Every extra breed means more money and more time and labour. If you are prepared for it, and are willing to give and do what is necessary, go further and satisfy your fancy. If you tire of it, dispose of some of the birds and keep your remaining breed or breeds pure. It is no credit to anyone to have a number of breeds jumbled together in hopeless confusion.



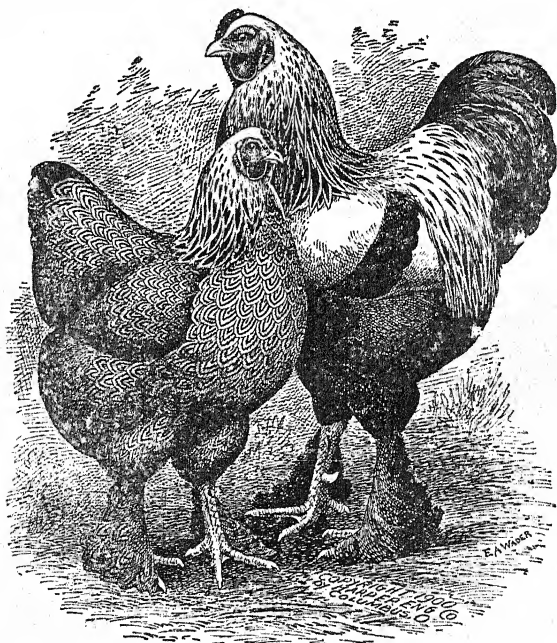
WHITE INDIAN GAME, AMERICAN TYPE.

FIG. 11.

There are people who have succeeded with three or four varieties. They started with one and when they had thoroughly studied the breed and improved it as far as possible, they took up another breed. They worked with the second variety

as they did with the first, and succeeded with this also. Such men are bound to succeed. They have the qualities necessary for the work; they do not spare themselves in trying to gain the object they aim at. Such men can take up one breed after another until they have 10 or 15 varieties, and all will testify to the care and labour devoted to them.

The conclusion of the whole matter is this. It is not the fowls, it is the man or woman who handles them that is the main factor in the business. Common sense and the power to use one's brains effectively are the two essentials in the successful keeping of poultry.



PAIR OF DARK BRAHMAS, AMERICAN TYPE.

FIG. 12.

There is another advantage in limiting one's choice to a single breed that is seldom mentioned but really deserves careful consideration. If one has only a single breed, when

the time comes to introduce fresh blood, he need buy but one or two male birds—if he introduces it from the male side. If he has five breeds, he will need to purchase five or ten birds. The majority of breeders, whether they have one or more breeds, have but a limited amount of money that they feel willing to set apart for this purpose. Say for illustration, that this sum is Rs. 100. The breeder who has limited his choice to a single breed can buy three birds at Rs. 30 each and thus insure the purchase of not only well-bred but of very good specimens. All the next season the flocks will show the effects of these purchases.

There is a decided advantage from a business point of view in being known as a breeder of one breed. In other words, after making the selection of a breed, it pays to stick to it. As a poultry writer, one needs to know many breeds. As an experimenter and producer of new breeds, it is necessary for one to handle nearly every kind; but as a breeder who expects to get pleasure or make money out of his fowls, he needs to cling to some one breed.

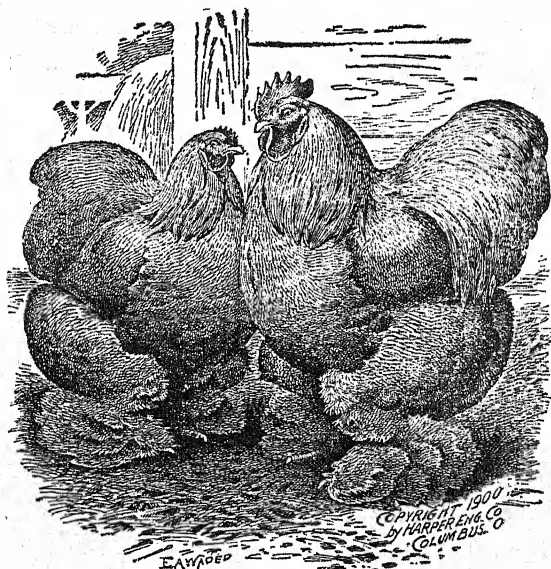
In the first place, it gives the people confidence in his stock. They say he breeds only one kind; there will be no chance matings among his fowls; he will know what he is about; he can give the buyer the best of the kind. And, singularly enough, people will also argue that as the breeder is a sensible man and has selected one breed, that breed must be the best breed to be had. If he issues a circular, the public's attention is not distracted by rival claims of different breeds so that it does not know what to buy, but it is focussed on a single breed and is convinced that that is the breed to buy.

Again, the breeder who has a single breed, and sticks to it, gets the full advantage of his exhibiting and advertising. Each year's prizes are cumulative. People remember that this man won on Rhode Island Reds or White Leghorns at the best shows. His advertising becomes cumulative also and his name becomes, through the law of association of

ideals, inseparably connected with the chosen breed. If one wishes to purchase a given breed, he will at once think of the breeder who has stuck to it for so many years.

If he should cease advertising, or if he should give up breeding that one breed, five years from now there would be people ordering that breed from him if he were still alive.

One breed is enough for the beginner. If the veteran adds several breeds to the one of his choice, still his chief



PAIR OF BUFF COCHINS, ENGLISH TYPE.

FIG. 13.

reputation will rest upon a single breed. And to obtain the best financial results, beginner or veteran needs to persist in the choice he has made, for in no other way can he secure the cumulative advantages of his winnings and his advertising.

Poultry For The Table—It is gradually dawning upon the poultry-keeping community in India that the old system, if system it can be called, is as useless as it is stupid, and that unless birds are kept upon a rational principle, profit is practically impossible. If we assume that an average laying hen costs two annas a week for food, or Rs. 6 per annum (pre-war

prices) it follows that, putting out of sight for the moment the question of labour and other expenses which follows where hens are kept in large numbers, profit is absolutely certain unless there is some very gross ignorance in the management. If, however, we add to the cost of the food the sum spent for labour, the interest of the money invested in the birds and their houses, the rent of the land and the losses which occur from deaths, even then there should be a substantial profit gauged from the point of view of the sum of money invested. Poultry-keeping as an industry is not able to maintain an individual European or a European family in India. It should be combined with some other form of work, say fruit growing and vegetable gardening and it can be so combined. But there are a large number of Indians and poor Anglo-Indians who could easily earn from 50 to 200 rupees a month from poultry-breeding and comfortably maintain a family.

Egg Production—We now pass to egg production. A hen consumes sufficient food to enable her to produce a larger numbers of eggs than is her average. Instead of sixty eggs, which is probably in excess of the average produced per hen in this country, hens can be induced to lay 120 to 250 eggs by the process of selections and by proper feeding. There is no doubt that even this figure will be exceeded, as breeders pay more attention to selecting their breeding stock from the best layers only, and as they grasp still more clearly the principle upon which the system of feeding is based. If, however, the average poultry-keeper could obtain 200 eggs per hen per annum, he would do very well indeed. But this is not usual simply because people will not devote that study to the subject which it really demands.

The Langshan, Australorp, White Wyandotte, Rhode Island Red, Brahma, New Hampshire, Rock and the Sussex are the best fowls to produce large brown eggs.

The Chittagong lays smaller eggs.

Leghorns, Minorcas, Campines and Anconas lay large whiteshelled eggs.

CHAPTER VI

THE DIFFERENT BREEDS OF FOWLS

There are many breeds and varieties of fowls to be found in Europe, America and Asia. Let us study for a moment such breeds as are profitable to keep.

(1) *Brahma*—The Brahma is most prominent as a family fowl. It is valued for its great size and hardiness, and for its being a good layer of rather large sized and rich eggs. The flesh of a four to six month old bird is very good, that of older birds is rather coarse.

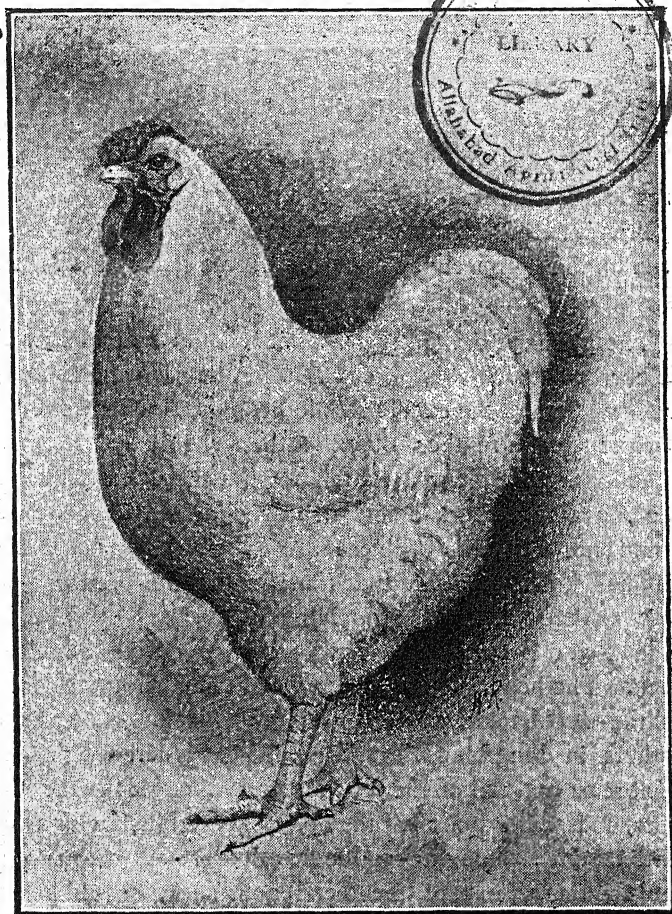
Brahmas are exceedingly quiet and tame, and can easily be kept in a small run with a four-feet high fence. The hens are good sitters and mothers. The chickens are hardy and grow fast, being ready for the table in from four to six months. Some birds of this breed grow to immense size and weight, cocks should weigh from 10 to 12 lbs., and hens from 7 to 10 lbs.

They are very handsome birds, majestic in appearance, having heavily-feathered legs, though less so than Cochins.

There are two varieties of Brahmas—Light and Dark. The outward appearance of both is similar in everything but colour of feathers.

The Brahma should have a small, neat head, small peacomb, and deep massive body. The back should be of medium length and broad, breast broad and forward, and the saddle should rise to the tail. The tail should be rather upright and spread out like a fan, but the sickle should be an inch or two longer than the tail. The beak should be strong, curved and yellow or dark. The comb—the smaller the better—should consist of three serrated ridges, the central ridge being the largest, and unite at the pike and curve backwards. The earlobes should be bright red and round, the wattles bright

red, long, and pendant. The neck should be curved, giving grace to carriage. The hackle should be flowing and abundant, increasing in bulk from the point nearest the head and fall over the back. The wings should be small and the



WHITE WYANDOTTE COCK.

FIG. 14.

points well tucked away under the saddle feathers of the cock, and under the fluff of the hen. The feathers of the back

and thigh should be abundant in the hen. The leg should be rather short and of light or dark yellow colour, feathered to the tip of the middle toe. The legs should be strong and well formed. The Brahma is square rather than lumpy and of sprightly and active habits, much more so than the Cochin.

In India birds heavily feathered on the legs are at a disadvantage. They suffer much from wet and damp during the rains and from heavy dews. Clean-legged birds are to be preferred in India.

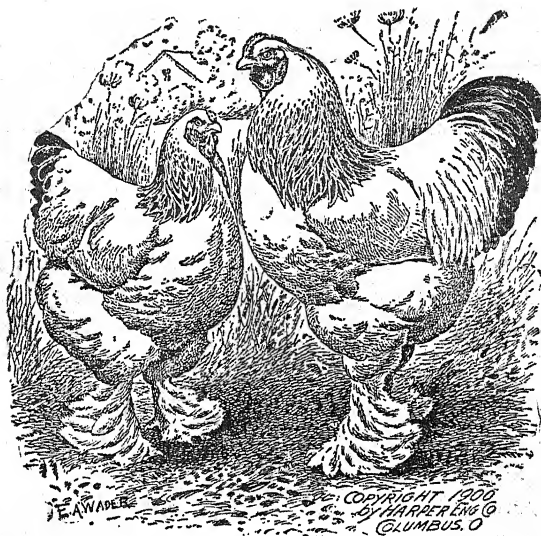
The tendency of all birds bred in the plains of India is to have less feather and fluff.

Brahma chickens are hardy and grow rapidly. If kept in a run and fed properly and protected from the sun and rain, they do very well.

The plumage of the Light Brahma should be mainly white, the correct shade being pure white. The flight feathers, the neck-hackle and the saddle should be black, with an edging of white to each feather. Black feathers should be interspersed in the legs, while the tail and tail coverts should be principally black, some feathers being striped with white. The fluff should not be dark. There are specimens of pure white Brahmas, but those with black markings are preferred and are considered the best at exhibitions.

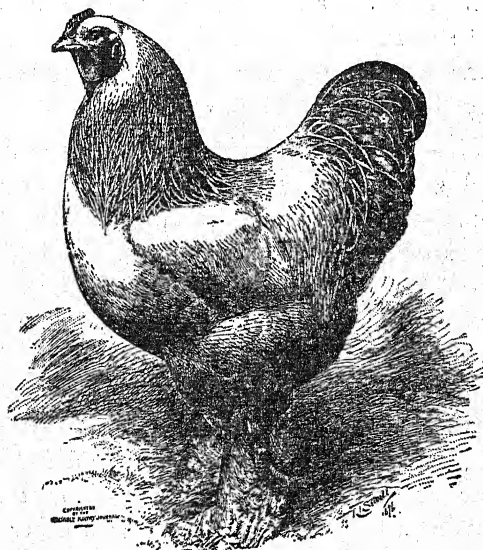
In Dark Brahmas the predominating colour should be black. The head, in both the cock and hen, should be white and the neckhackle white, striped with black. The primary feathers in the wing should be black bordered with white. The breast and tail of the cock should be black, the back white, and other parts of the body chiefly black with a little white mingled among it. In the hen the ground-colour of the whole plumage, except the head and neck, should be dark grey and each feather pencilled with metallic black. The fluff should be black. Some hens are of a lighter grey with dark grey pencilling. The lustrous baron the wing of the cock should be green-black.

Light Brahmas are considered better layers than the Dark



PAIR OF LIGHT BRAHMAS, ENGLISH TYPE.

FIG. 15.



LIGHT BRAHMA COCK, AMERICAN TYPE.

FIG. 16.

ones, but Dark Brahmas attain to a greater size than Light ones. In judging Brahmas, colour, size, shape, feathers and conditions must be taken into consideration. In breeding Brahmas, the first and most important point is the selection of the birds to be bred from.

Both the males and females should be as perfect as possible, and should be descended for as many generations as possible from only first-class stock. In order to acquire a correct knowledge of the standard of perfection, in any breed, the reader should study "The Illustrated Book of Poultry," by L. Wright.

The Brahma is supposed to have originated in India but now it is largely bred in Europe and America. The best birds are imported from England and American Brahmas are better layers and table birds than those bred in England. English breeders have gone in too much for fancy points and heavy feathering and sacrificed useful qualities. Probably the Brahma originated from a cross between the Cochin and the Malay fowl. It is now an established breed and has all the good qualities of both the Cochin and Malay.

There are very few good Brahmas in India today. If good birds are required one will have to import.

(2) Cochin—The Cochin somewhat resembles the Brahma in shape and general appearance but is rounder and more fluffy. The hens are fairly good layers and good sitters and mothers, but are very clumsy and apt to break their eggs and crush their chickens. They are very quiet and tame and can be kept in a small run enclosed with a three-feet fence. They are not so sprightly and active as the Brahmas. They are great favourites with many people and are essentially the fanciers' fowl.

The chickens are hardy and easily reared but should be kept in moderate-sized runs and protected from the sun and rain. They do best when kept separate from other chickens. Cochin chickens need extra animal food and a larger quantity of food than chickens of any other breed.

Cochins are not very good table fowls; their flesh is rather coarse after they are six months old. But their eggs are very rich and usually of a fair size.

They grow to a large size. The cocks should weigh from 9 to 11 lbs., and the hens from 7 to 9 lbs.

The comb of both the cock and hen should be single, small and erect, the head small and neat, the ear-lobes red, the eyes red or dark yellow, the neck rather short, and the hackle flowing widely over a short and broad back which should rise at once into a broad saddle in the cock and an ample cushion in the hen. The breast should be broad, deep and full, the tail of the cock and hen should be as small, low and full as possible with very little quill in it. The wings should be small and deeply tucked in between the cushion or saddle above and the fluff below; the legs should be short, thick, yellow in colour, and heavily feathered. Some birds have very few feathers on the feet. In England the Cochin has been bred to great perfection in colour and shape, but their good laying and table qualities have been sacrificed for exhibition points.

There are five leading varieties of Cochins: the Buff, Partridge, Cuckoo, White, and Black. The Buff and the White are the handsomest.

Buff—The plumage of the Buffs may vary in shade from bright lemon to deep cinnamon. The hen should be of the same shade all over. The hackle, saddle feathers and wing bar of the cock may be a little darker than the rest of the body; a very small amount of black may be allowed in the tail and flight feathers, but none on the hackle or saddle. Neither should any white be seen in the tail, wing or other part of the body.

Partridge—The breast, underpart of the body, thighs and tail of the cock should be black; his hackle and saddle should be golden with a black stripe down the centre of each feather. He should have a rich red back and bar on the wings. The plumage of the hen should be light brown and the feathers

closely and uniformly pencilled a darker brown, her hackle should be deep yellow.

Cuckoo—The plumage of the Cuckoo is a light bluish grey, barred across with lines of darker shade, like the Barred Rock.

White—The plumage of the White Cochin must be pure glossy white all over, with no feather of another colour.

Black—Black Cochins must be of a glossy greenish-black all over.

The Cochin is a China bird but is largely bred in Europe and America.

(3) *Langshan*—The Langshan is a China bird but is now bred to perfection in England and America. They thrive well in India but will not stand wet and damp and will not thrive well in close confinement. There are very few in India.

(4) *Rock*—Rocks are very handsome and useful birds. They have plenty of good-flavoured flesh and are good layers. They are capital sitters and mothers and are quiet and tame. They are hardy, and can be kept within a five-feet high fence in rather large runs. The chickens are hardy and mature early. Cocks should weigh from 9 to 11 lbs. and hens from 7 to 8 lbs.

The comb should be single and small but there are some with rose combs, the beak yellow, the neck curved and back broad, the breast very broad, the wings well tucked up, the tail short and full, the legs rather short, stout, clean and yellow, the birds should be compact and square in shape.

There are four varieties of this breed—the Barred or Cuckoo, Buff, Black and White. The Barred and White are considered the best. All these varieties are alike in everything but the colour of their plumage. The plumage of the Barred should be light-grey or steel-grey and each feather striped with bars of bluish black. There should be no black, white, red or yellow feather in the plumage. The White ones should be pure white with yellow beaks and legs. The White ones are very large and handsome birds and good layers.

It is very difficult to breed the Barred to perfection in

colour. Some will come very light, almost white : others will come dark, almost black. The White and Buff are bred more easily. The only way to prevent the Barred Rocks from coming too light or too dark is to mate the breeding stock properly. If the hens are too light in colour, a cock should be selected that is rather dark : or if the hens are too dark, a light cock should be selected.

The Rock is an American breed produced by crossing their Dominique with the Black Langshan and the Malay or Chittagong.

(5) Wyandotte—The Wyandotte is a good breed of fowls. They are good table birds and layers. They are very good sitters and mothers and are very hardy when mature. The average weight of the cock is between 7 and 9 lbs. and that of the hen between 5 and 7 lbs.

The comb must be rose, with a good spike and closely fitting to the head, the beak should be yellow, the breast deep and broad, the legs rather short of a bright yellow colour and free from feathers. In shape it resembles the Rock.

There are now five principal varieties of Wyandottes, the Silver-laced, the Gold-laced, the White, the Columbian and the Buff. Other varieties are the Buff-laced, the Partridge and the Black. The White ones are the prettiest and the best all-around birds. The other varieties are also very handsome birds. The White Wyandotte is an excellent layer of tinted eggs. In laying contest they have often beaten the Leghorn.

The plumage of the Silver-laced should be black striped or laced with silvery-white : the tail black and full, the outer edge of the wing primaries white.

The Columbian should be like the light Brahma in colour. It is a large bird and a good layer.

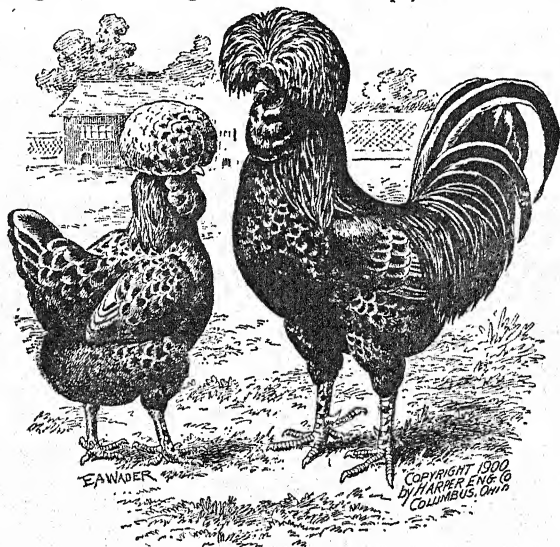
The Black and the White should be self-coloured. The Gold-laced should be black-laced with bright yellow. The Partridge should be coloured like the Partridge Cochins.

The Wyandotte is an American breed made from across

between the Brahma, Silver-faced Hamburg and the Chittagong or Indian game.

(6) *Houdan*—The Houdans are useful birds. They have plenty of good flesh on them and are capital layers but are not as good all-around birds as the Wyandottes or Orpingtons. They are fairly hardy on dry soil and moderate climate but will not thrive in Bengal, Assam, or where the rainfall is heavy. They are a non-sitting breed. The cocks should weigh from 5 to 7 lbs. and the hens from 4 to 5 lbs.

The comb must be leaf-shaped and above it a large crest. The crest must be large, arched, full in the centre and falling over the sides; the beard must be very full and the wattles fairly long and thin; the face red; the nostrils arched; the beak black; the hackle full; the breast broad and full; the back straight; the wings carried well up; the tail full, high



PAIR OF HOUDANS.

FIG. 17.

and nearly erect; sickle black and white; the legs thin and nearly white; the legs thin and nearly white; the thigh short and thick.

They always have a distinctly defined fifth toe. Their plumage should be black and white. The black must be of an olive-green tint and the white evenly spangled all over the body. The Houdan is a French breed.

(7) *Malay or Chittagong*—These birds are called Malay because they are natives of the Malay Peninsula, and Chittagong because they are largely bred in Chittagong. These fowls are also called "Deang fowls," as the best specimens are bred in a place in Chittagong called "Deang". They can also be gotten in Bodalpara and Anwara, in Chittagong. They are very large birds, the cocks sometimes weigh from 8 to 10 lbs. and measure two feet six inches from beak to toe, the hens weigh from 6 to 9 lbs.

The flesh of the Chittagong fowl is excellent. The hens lay well but are not very good mothers because of their quarrelsome nature. If each hen is kept alone with her chickens, she will do splendidly and protect them from all intruders. Adult birds are very hardy, but do not bear confinement well. They do best when given a free range. They are very quarrelsome and when kept in confinement, need a high fence to keep them in. The chickens for the first month are not very hardy and need much care, but they become very strong when they grow to be about three months old. The chickens will not stand confinement and pampering. If given their liberty from the second or third day after they are hatched, fed judiciously, and kept out of damp and wet, they will do very well. They need some extra animal food. The best time to raise Chittagong chickens is February and March, and from July to September when there is plenty of green grass and animal food about the place. The Chittagongs grow rapidly and make excellent birds for the table. The chickens should be reared by themselves and not mixed with chickens of other breeds.

The Chittagong should have a small pea-comb, like a soft lump covered with small warts, the head and neck should be long, the beak yellow, the wattles very small and red, in the

hen hardly visible, the ear-lobes small, red, sometimes with a little white, the eyes white or light yellow, eyebrows prominent and overhanging the eyes making the head look very broad, the neck long, the breast broad and deep, the carriage very upright, broad shoulders, slightly narrow loins, the wings carried high and projecting at the shoulders, the back sloping gradually to the tail, the tail small and full, in the cock it should droop, the legs yellow, straight, long and strong, without feathers, the plumage very close, firm, short and glossy, the feathers narrow.

There is no fixed standard of colour for this breed. Good birds will be found in all colours. The poorer people of India have no proper idea of scientific breeding. The Buff, White, Black, Darkbrown and Grey are the recognized varieties, but the Buff or Light Yellow is considered the best. It will take years of most careful breeding to get these birds to breed true to one particular colour.

Bufs—The cocks should be buff or golden, with bright yellow hackle and saddle. There should be no black or white feather about the neck, hackle or back. The tail and wing primaries should be ash-grey or white tipped with green, the sickle ash-grey or black with yellow lacing, the coverts ash-grey or black with yellow border. The hen should be buff or light yellow, the back of the neck, hackle and smaller feathers in the tail may have some ash-grey feathers, the tail and wing primaries should be ash-grey or white, a little black in the tail and primaries is allowable.

The white ones should be pure white all over with yellow legs and beak. The Greys should be in colour like the Light or Dark Brahma.

(8) Aseel or Indian Game—Aseel means real, true, and the Aseel fowl is supposed to be the real pure Game. It is one of the best table birds, its flesh is peculiarly well-flavoured and there is plenty of it.

Aseels are not good layers. They are good sitters and good mothers. They require a certain amount of liberty and

will not thrive well in confinement. They are intensely pugnacious, and on this account, are hard to keep. The chickens are rather delicate and need great care and plenty of animal food and perfect liberty. They should not be kept with chickens of other breeds.



WHITE HYDERABAD GAME COCK.

FIG. 18.

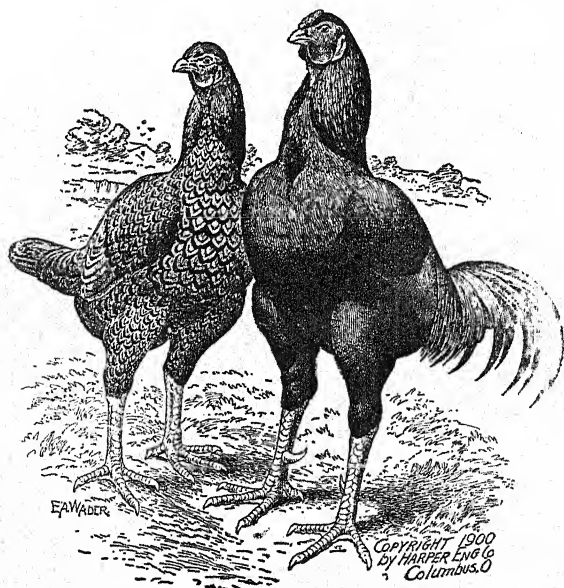
The real Game fowl is a large noble-looking bird. The best specimens are now found in Hyderabad and Mysore where they are bred to a great size.

The cocks should weigh from 9 to 10 lbs. and the hens from 7 to 8 lbs.

The comb must be small and pea-shaped, face long and somewhat slender, heavy eyebrows, thick and long neck, hard and close-feathered, very broad breast, very upright carriage, small and drooping tail. In appearance they somewhat resemble the Chittagong, but have shorter legs and are more round and compact

The colour is black, white, duck-wing, black and red, and mottled. The pure white are the handsomest birds. No bird can equal the pure Indian Game for putting size and stamina into other breeds.

These birds are called the *Kullam* in Bombay and some parts of India. The Indian Game is bred to perfection in England, America and Australia.



PAIR OF BLACK-RED INDIAN GAME.

FIG. 19.

Good stock birds sell for from thirty to one hundred rupees for a trio—one cock and two hens. Some choice specimens have been sold for 500 rupees each.

(9) Ghagus—The Ghagus is a peculiar Indian breed. In shape and appearance they are very much like the Faverolle but without feathers on the legs. They are good table fowls and fair layers. They are hardy, but will not bear confinement. They are good sitters and mothers.

The comb is either single or pea and small, the wattles and ear-lobes small, neck thick, throat loose and baggy, some have whiskers and beards, the body large and rather square, the legs rather long, smoky-yellow or greenish, both the cocks and hens grow very large. They are of various colours—red, bay, brown, black and grey. I believe this breed was produced from a cross between the Malay or the Indian Game and the Brahma or Langshan and the Houdan. The Ghagus is becoming very scarce and is not often seen nowadays. The best specimens can be procured from the Gipsy Nomads who wander over India, especially in Deccan, Mysore and Sind.

(10) Orpington—The Orpington is one of the best breeds produced in England. In 1886 that great poultry-man, Mr. William Cook, of Orpington, England, originated them. The Orpington is a most useful bird—a good table bird and an excellent layer—two qualities that are very seldom found in any one breed.

There are now three distinct popular varieties of this breed—the Black, the Buff, and the White. The Black variety has been produced by crossing together the Barred Rock, the Black Clean-legged Langshan, and the Black Minorca. It is very much like the Langshan in shape, size and laying and table qualities, but is without feathers on the legs, somewhat rounder in make and shorter in leg. The colour should be exactly that of the Black Langshan, i. e., pure black with a glossy green or purple sheen.

The Buff Orpington has been produced by crossing the Buff Cochins, the Golden Hamburg and the coloured Dorking. There is also now Malay blood in it. The colour of the Buffs should be that of the Buff Cochins. In size, shape

and useful qualities the Buffs are equal to the Blacks. The Buffs are considered better layers.

The Whites have been produced by crossing the White Rock, White Dorking, White Leghorn, and White Langshan or the White Surrey fowl.

There are also Blue, Speckled, and Red Orpingtons. The White, Black and Buff are the most popular and fetch the highest prices in England, America and Australia.

Orpingtons should have no feathers on the legs. They should have red faces and ear-lobes, broad breasts, long breast bones, white flesh, short legs, in the Buffs and Whites white or pink in colour, tail carried well back and straight. Among all three varieties you will find single and rose combs. The comb should be of small size and evenly serrated and straight.

The Orpington is very much like the Rock or Langshan and looks like a clean-legged Langshan with a tail between that of a Cochin and Langshan, and short in legs. Cocks should weigh from 9 to 11 lbs. and hens from 7 to 9 lbs.

Some excellent Orpingtons have been imported from Australia by breeders in India. These are usually of a utility type and known as Black Australorps. They are tighter in feather, longer in leg, and not as large as the Black Orpington which is of exhibition type with very short legs. See Fig. 24.

There is really very little difference between the Buff Orpington and the Buff Rock, or the White Orpington and the White Rock. The chief difference is in the colour of the legs and skin. The Orpingtons have white skins and legs and the Rocks have yellow. But the Orpingtons are shorter in legs and looser in feather than the Rocks.

⟨11⟩ Silkie—These curious and beautiful little fowls are remarkable for the colour of the skin and silky hair-like nature of the plumage. They are of Chinese origin. They are not profitable poultry in the ordinary sense, but make capital sitters for pleasant or partridge eggs and are good mothers. The head and beak must be small, face dark purple,

comb a queer lumpy round rose comb of dark purplish colour, crest, full and round, not cockatoo shape, wattles long, purplish and tinged white, body square, covered with silky fluffy feathers, wings carried low, legs shortish and bluish-black in colour, some have five toes, some only four. The fifth toe is a deformity that should be bred out. They are good eating in spite of the purple colour of the skin. They are very hardy and easily reared. They need a great deal of liberty and their chickens thrive best when allowed to run with their mother in large yard or garden. Some of these birds have feathers on the legs. They should be either clean-legged or very scantily feathered, but never with vulture hocks.

(12) Dorking—This is an old English breed. The general characteristics of the Dorking should be a large, deep square body, the breast-bone being long and prominent, white skin, white legs and feet, five toes, the fifth being clearly separated from the fourth and turning upwards and white toe-nails. The fifth toe is a deformity and a disfigurement which should be bred out. The head should be large, wattles large and pendulous in the cock, not as large in the hen, and rounded, eye full and bright, comb single or rose in coloured Dorkings, single in silver-greys (though fine rose silver-greys have been shown), rose in white or cuckoo.

The single comb should be upright in the cock. In the hen, it should fall on one side of the head. In the cock it should be thick, firm on the head, evenly serrated, free from side sprigs, semicircular in outline seen from the side, and of fine texture. Thighs should be stout and covered by the plumage, legs short and stout and spurs carried inside. (Dorking hens and even pullets frequently have spurs of considerable size). The general appearance should be massive and dignified.

Dorkings are inferior layers, but they lay large eggs, and are very good table birds. The chickens are very delicate and difficult to rear. They are very scarce in India.

(13) Minorca—The Minorcas are in many places known by the name of "Red-faced Spanish", and are the nearest, in shape and appearance, to the Black Spanish, of all varieties of fowls. It is probable that the two races were originally one and that the faces then were red, as the Minorcas now have them, but the Spanish have been bred with white faces and spoiled by too fine breeding. The shape is like the Leghorn but the comb is larger, and there is the red face, the white ear-lobes and the clean legs. There are two colours, the blacks and the whites but the latter are very little seen. The metallic black plumage of the blacks makes them very handsome and they are, for the same reason, very suitable for keeping in towns or in such districts as are not over-clean from the proximity of factories or works of any kind. As layers, Minorcas are one of the best small breeds we have at present. They are capital foragers and small eaters. They are very good layers when given free range. They lay very large white eggs and a great number of them. They are among the best fowls to be found in India and are rapidly growing in favour, as they do well both in the plains and the hills. In weight the Minorca cocks will be 8 lbs., hens 7 lbs.

(14) Campine—The Campines are a breed of Belgium fowls of the Leghorn type. They are good layers of large white eggs, and carry a fair quantity of well-flavoured flesh. They are marked with black and white bars. The cocks weigh from 5 to 6 lbs., and the hens from 3 to 4 lbs.

(15) Hamburg—Hamburgs are small fowls but lay very well. There are a number of varieties of this breed. Some of them are very beautiful. They are very much like the Leghorns in quality. They are not common in India.

(16) Leghorn—A most useful small breed is the Leghorn. It is a good layer of large white eggs. There are several varieties of this breed, such as the white, brown, black and buff. Of these, the white and brown are the most useful, they are larger and lay larger eggs than the other varieties. The Leghorn excels as a layer. As a breed for the novice

it cannot be beaten as it is a good forager and is very hardy. Leghorns fly rather well so they need a high fence to keep them in.

The comb of the Leghorn cock should be single, large, erect, and evenly serrated with five or six wedge-shaped spikes. The hen's comb should be similar in conformation to that of the cock, but carried drooping to one side of the head. There are also rose-combed Leghorns. The face should be red, the lobes pure white. With all the varieties, the legs should be yellow in colour. The best birds will weigh—cocks 6 lbs. and hens 4 lbs.

(17) Ancona—The Ancona is really a speckled variety of the Leghorn family.

(18) Sussex—The Sussex fowl is the oldest breed of English fowls now existing. It is sometimes called the Surrey fowl. This was one of the ancestors of the coloured Dorking. There are three recognized varieties of this breed—the Light, the Speckled, and the Red. There are also white and brown birds. The Light ones are marked like the Light Brahma and are the favourites.

The Sussex fowl is hardy both as a chicken and later on, and the hen is a very good layer and mother. But the commanding merit of this breed is as a table fowl. They are large square built birds, with close plumage, single comb, short legs free from feathers, carriage erect and graceful. Cocks weigh 9 lbs., hens 7 lbs.

(19) Rhode Island Red—This fowl originated from a cross between the Brahma or Langshan and the Chittagong and the common farmyard fowls of Rhode Island in America. The mixture of breeds still shows itself in the different types found among these fowls. Some are single-comb, some are rose-comb, some are like the Wyandotte and some are like the Rock in type. The prevailing colour is red.

They are now standardized and are being bred extensively in England, U. S. A. and India. Their chief value is as prolific layers of large dark-shelled eggs. One of the best

all-around breeds, combining both table and egg laying qualities is the Rhode Island Red. They are very hardy,

THE POINTS OF THE FOWL.

(IN DIAGRAM)

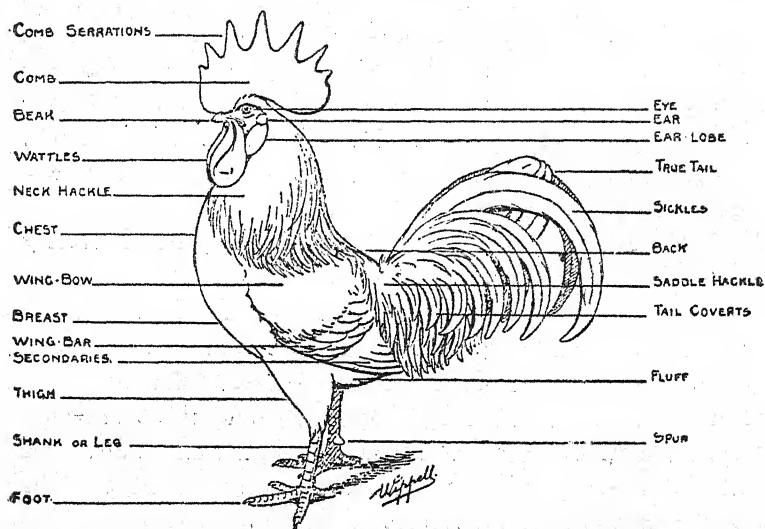


FIG. 20.

stand damp well, and the chickens are easy to rear. Being lighter than the Orpington, they stand the climate of India better. They have improved immensely during the last few years and are growing in favour, in spite of the difficulty experienced in breeding them true to colour. The brighter red has given place to one of almost chocolate colour. In fact, it seems impossible to get a red too dark. They are inclined to smuttiness in the under-colour. Smutty birds are necessary to breed from but are of no use in the show pen.

The birds are handsome and keep their appearance better than most breeds. For the novice, they have much to recommend them. One fascination lies in the fact that old breeders and novices stand much the same chance of breeding a winner, providing the stock birds are from a reliable

source, and are properly mated. The reason for this is, that the breed being yet in the making, there is always the tendency to throw back.

The body should be long, broad and deep, with breast carried well forward and back flat. Legs and feet should be deep yellow and may show some brown horn colour. Colour of male should be a rich dark red with breast as near top colour as possible, both to be well glossed, tail, black. Wing, when open, shows black in both primaries and secondaries. Female colouring should be a rich even shade of deep red throughout, about the colour of the breast of the male, wing and tail markings as in the male. Neck hackle usually shows a little black marking at base.

Single and rose combs are allowed but the single combs are more popular. Lobes should be red and eyes red. Weight should be—cocks $8\frac{1}{2}$ lbs, hens $6\frac{1}{2}$ lbs.

(20) Faverolle—The Faverolle is the most popular French breed. It is an outcome of crosses between the Brahma, the Dorking, and the Houdan. There are two recognized varieties—the salmon and the white. In both sexes the comb is single but they have beards or muffs like the Houdan. They should not have crests. The body is broad, deep and wide. The legs should be of medium size with scanty feathering. They have five toes like the Dorkings. They are good layers and table birds. The cocks should weigh from 7 to 8 lbs. and the hens from 6 to 7 lbs.

(21) Malines—The Concau de Malines is the leading variety of Belgian fowls. They are good table birds. Cocks weigh from 9 to 10 lbs. and hens from $6\frac{1}{2}$ to 8 lbs. They are an outcome of crosses between the Brahma and the common fowls of the country. They are of two colours—the white and the cockoo.

(22) New Hampshires—When I left India in 1956, I noticed that New Hampshires had been imported and were appearing at poultry shows. The following information may therefore be of interest to some.

"I suppose the New Hampshire is a fairly good variety for India, though they certainly don't have the fine colouring nor uniformity of the Rhode Island Red. In breeding the New Hampshire, the originators emphasized utility and neglected appearance. As compared to Leghorns, the meat qualities (and perhaps the brooding ability?) of the New Hampshire might be of considerable advantage.

"New Hampshires—This breed is of comparatively recent origin, having been admitted to the Standard of Perfection in 1935. The New Hampshire was developed in the State of New Hampshire, using Rhode Island Reds as the original blood lines. The New Hampshire was selected particularly for rapid feathering and rapid growth and, possible through heavy culling, developed a high degree of hardiness. Early maturity is also a characteristic of the breed.

"The New Hampshire is not noted for exceptional egg production, but its hardiness, early maturity and desirable meat qualities make it a good general purpose bird. The breed is divided into two rather distinct types: general purpose and broiler type.

Description—Weights: Cock $8\frac{1}{2}$ lbs., hen $6\frac{1}{2}$, cockerel $7\frac{1}{2}$, pullet $5\frac{1}{2}$.

Comb: Single, medium size (larger than RIR comb) may be slightly lopped in females

Colour: Male—Chestnut red with some black in main wing and tail feathers. Back brilliant deep chestnut red, saddle rich brilliant reddish day, slightly darker than neck colour

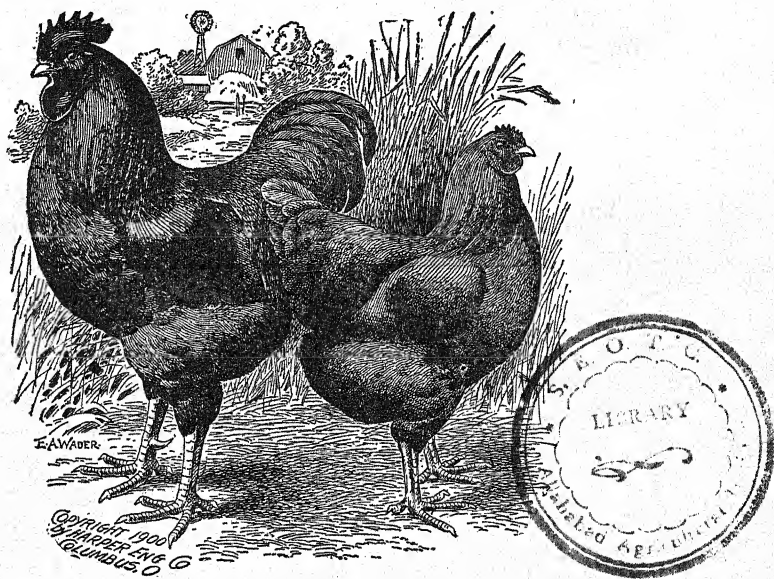
Female—Chestnut red, with narrow stripes of black on main wing feathers, back medium chestnut red."

I am indebted to Dr. Stanley L. Balloun of the Department of Poultry Husbandry, Iowa State University, Ames, Iowa for the above note.

Imported Poultry—Much has been said about the advisability, or otherwise, of importing fowls from England, Australia, America and other countries.

Years ago, the only wise course to pursue if a pen of pure-bred birds was desired, was to import them. The difficulty in obtaining fresh blood resulted in in-breeding and cross-breeding until the birds had deteriorated to such an extent that they were not fit to breed from.

Today, things are different and many of our Indian-bred birds can hold their own against those from overseas. It is not unusual for the best bird in a show to be one bred in India, although there may be many imported birds competing. There are breeders all over India and it is possible to procure new stock entirely unrelated to one's own birds.



PAIR OF BUFF ORPINGTONS.

FIG. 21.

Still, the best breeders import, and even novices sometimes send abroad for their first pen of fowls. By doing this,

they are keeping in touch with the standards in other countries. All the improved breeds have come from England, Australia or America, and these are regularly being improved upon. Hence, it is better for us to go on importing as we are able.

Imported birds are sometimes seriously affected by the long voyage, and take months to recover, if they ever recover at all.

Others arrive in splendid condition and look as if they have only been in their crates for a few days.

The exportation of birds from England is becoming a more important business and greater care is being taken to see that they are properly crated, despatched and cared for on the voyage.

Birds of 9, 10 or 11 months are the best ones to import as they stand the journey better and become acclimatized more readily than the older ones. The best time of the year to import is during the months of October and November. They, then, have the cold weather to become acclimatized and during that time as many chickens should be reared from them as possible. The hot weather and rains may affect them rather badly, so extra care should be taken of them during these trying months.

If they survive the first year, the hens will probably lay better the second year and the chickens will be stronger.

Birds hatched from imported stock are usually more hardy than their parents and give better results. For this reason, it is wise to set every hatchable egg and rear as many as possible. These fowls bring a better price than those from Indian-bred fowls, as do also the eggs from imported stock.

It is a good plan to import a cock and mate it with the hens reared in India, if one cannot afford to buy a whole pen. This brings in the fresh blood so necessary to keep the birds up to the standard and at the same time the chickens hatched will be hardier than those from imported hens.

The secret of success lies not merely in having good birds to start with, but by carefully selecting, mating and breeding them.

An ounce of experience is worth a pound of theory. There are some things that must be learned by one's own personal experience, and things learned in this way are not soon forgotten.

Keep on trying, study and work, work and study. Read all the good books and papers you can get hold of, but do not abandon a good method because someone else suggests, what they consider, a better one. It has still to be proved and much valuable time is lost in changing from one way to another and thus upsetting the fowls. Study your birds, work with them and improve them until you have them as near perfection as is possible. You will not always be successful, but do not be discouraged. See where you have made a mistake and avoid the same error the next time. Experience will cost you time and money, it will also cost you thought and labour. You cannot procure experience without such expenditure. It is possible to keep poultry for 30 or 40 years and still know very little about them. Poultry-keeping needs thought and labour just as much as the successful practice of anything else in life.

The Best Breed—Many people ask the question, "Which is the best breed for laying?" or "Which is the best breed for table purposes?" These questions are very difficult to answer for various reasons. Some birds lay more eggs than to some other birds, but the eggs are small, some will lay large eggs but not very many. Now, what do you mean by a good layer? A hen that lays small and many eggs, or a hen that lays large and fewer eggs? Then, again, all hens of the same breed will not lay the same number of eggs, nor will they lay eggs of the same size. There are bad and good layers among all breeds. It is quite impossible to say which breed is the best layer. *It is not so much the breed as it is the special strain or family of the breed that proves good*

layers; and this strain is made by careful thought and breeding. The same thing applies to birds for table purposes. The best breed for a fancier is the breed he likes best or has worked longest with. The ideal fowl is the one that is beautiful to look at, will lay about 150 large eggs during the year, and will give a good account of itself when served up on the table. There are such fowls. You will not find many in the market, but you can make them at home if you want to do so. They are the product of money, time, thought and labour. They will do better year by year if you still work with them. An ideal fowl is not merely a fancy bird with beautiful feathers and nothing else. It is a bird as large as possible, handsome or even beautiful, carrying plenty of meat and producing a good number of eggs. And such birds can be found among many of the breeds mentioned in this book.

Size—The size of fowls is a subject of some interest. Some very small birds are found among the large breeds and some small breeds will produce fairly large birds. There are Bantams among Brahmas, Cochins, Rocks, Langsams, Game and Chittagongs. The Houdan, Minorca, and Leghorn are small birds, but some of them will weigh from 7 to 8 lbs. The size of a fowl is entirely a matter of breeding and rearing. You can produce Bantams from the large fowls, and you can produce large fowls from Bantams if you will only give thought and labour to it. The correct thing to do, however, is to keep your birds to the standard weight. We do not want freaks, but straightforward honest birds which can be depended on.

The size of the eggs also is a matter of interest. The Cochin family is supposed to lay small eggs, very few weighing more than $1\frac{1}{2}$ ounces. The Brahma also lays only medium-sized eggs. The Rhode Island Red, Wyandotte, Orpington and Rock lay eggs of good size, usually weighing 2 ounces. The Minorca, Houdan and Leghorn are small birds, yet they lay large eggs. The Chittagong is a large breed

but it lays a small egg. New Hampshires lay eggs of good size.

Now the size of the egg also is not so much the question of the breed as it is of the strain. By proper selection, mating, breeding and rearing you can make a strain—the family of the breed you have—lay large eggs.

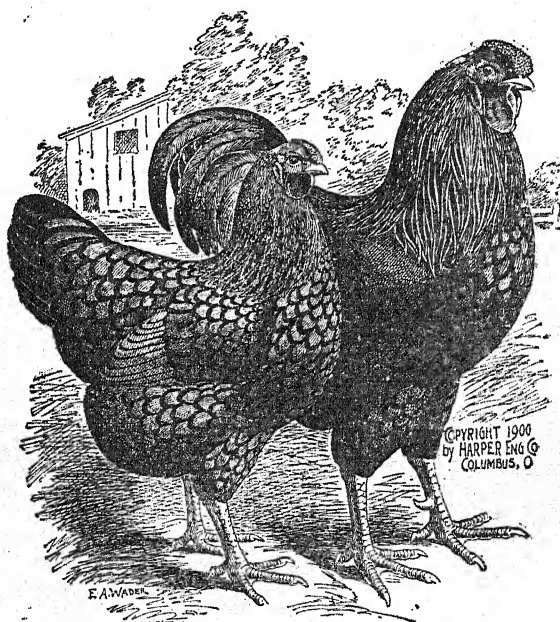
In England, America and Australia eggs weighing 2 ounces are considered to be of the proper weight. You can make your fowls lay large eggs by hatching from eggs weighing 2 ounces and over. This is a good rule to make and stick to, as only by this means can we counteract the tendency to smaller eggs that seems to prevail in the trying climate of India.

Buying Eggs And Fowls—It is much better to buy ordinary eggs from a yard where the fowls are properly selected, mated and bred, than to buy some grand-looking fowls from a yard where selection, mating and breeding are neglected. The eggs procured from the yard of an experienced breeder will produce at least 10 percent of very superior chickens that will, in the turn, again produce some first-class birds. Every egg will not produce a bird of equal value but where a certain quality is being bred for, that quality will be reproduced in some measure in a portion of the chickens raised from these eggs.

Pure=Bred Or Cross=Bred—All the breeds, such as the Brahma, Cochin, Rock, Wyandotte, Orpington, Rhode Island Red, Houdan, New Hampshire, and the innumerable variety of fowls found today are manufactured. The Games and Chittagong are probably the oldest breeds.

You can make any variety of fowls by careful selection and breeding, but others have spent a great deal of time, money brains and labour in producing the variety of breeds we now have. What is the use of going over the same ground and trying to produce what has already been produced? Be content to take some of the varieties already produced and work on them and try to perfect them. You will get better results

from what we call pure-bred birds than from birds that have been mixed up together. It may become necessary to put some foreign blood into a breed in order to improve certain points, but this should not be attempted by any person who is unacquainted with poultry culture. When two pure breeds are mixed together, the bad qualities of both parents are more likely to predominate in the progeny than the good qualities. And the further the mixing process goes on, the quicker the progeny will deteriorate.



PAIR OF GOLDEN-LACED WYANDOTTES.
FIG. 22.

Egg Production And Fertility—The majority of country fowls lay from 30 to 60 eggs a year. Sixty eggs for each hen is a high average. Good breeds of hens will lay as many as 150 eggs, and some have laid 300 eggs and over in 12 months. People are now trying to make hens lay 365 eggs a year. You may not be surprised if some one tries to produce hens

that will lay two eggs each day of the year. We sometimes hear of hens laying four eggs in three days and repeating this performance regularly. Now a days hens are called laying machines. This excessive production weakens the germ and a percentage of the eggs prove infertile. If you want a large number of eggs, you must not want chickens. If you want chickens, you must be content with fewer eggs.

People are very exacting. They want 250 eggs from a hen and they want 250 chickens from the 250 eggs. If a hen lays 150 eggs in 12 months and you raise fifty chickens from those eggs, you have done well. Large producers are kept not for breeding purposes but for supplying eggs to the market. If you want a lot of strong, healthy, vigorous chickens, select a good, large, healthy bird in her second or even third year that will lay 150 eggs in 12 months, and be satisfied if two-thirds of her eggs hatch. The jungle hen will lay only from 9 to 12 eggs, then become broody and begin to incubate her eggs, such hens will generally raise from 11 to 12 chickens from 12 eggs. They are satisfied with bringing up only three broods a year.

Bantams—Though kept by many in England, U.S.A. and elsewhere, they are kept in India by only a few enthusiasts and lovers of poultry. One authority on Bantams in India is the Maharaja of Pithapuram who has kept them for over 40 years. They have a fascination of their own, make splendid pets for children and are most ornamental and bred only for pleasure and fancy.

It may be noted, however, that many varieties of Bantams are good layers and the egg, though small, is rich and of a good flavour. Likewise the meat is claimed to be of very high quality. Bantams are specially suited to towns and city back yards where space is limited.

Breeds—Bantams may be classified as Ornamental Bantams and Game Bantams. Ornamental Bantams include the following breeds: the Sebright, the Rosecomb (prototypes of the Hamburg fowl), Brahma, Cochin, Polish

and Japanese. There are of course many more also. The Sebright Bantam, both the Silver Sebright and Golden Sebright, are among the most beautiful marked fowls in existence. The white Wyandotte Bantam is also very beautiful and very popular.

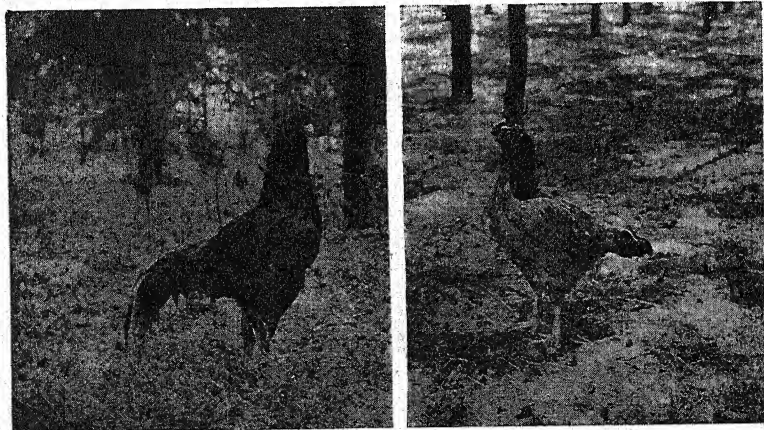
The Game Bantam class contains many varieties of Game, such as the Black Breasted Red, Spangled Old English Game, Golden Duckwing, Silver Duckwing, Berchen, Red Pyle, White and Black. The most popular and probably the most beautiful coloured in this class is the Black-breasted Red, very popular in the U.S.A. In England, the Old English Game, also a black-red variety is much admired and kept.

Care and Feeding—What has been said as regards care etc. applies equally to Bantams. Houses, runs etc. are naturally all on a much reduced scale. In regard to feeding, the whole object is to *keep down size*, therefore *hard grains* are used and not mash feeding, as the latter is used to increase size and weight. Rice is largely fed by experienced Bantam breeders as it contains practically no bone-forming properties, therefore the birds are kept down in size. There are very few good Bantams in India. Those desiring to keep good ones are advised to import from England. Eggs can be easily secured by air nowadays. Or a trio or pen can be imported. The writer's preference is for Old English Game.

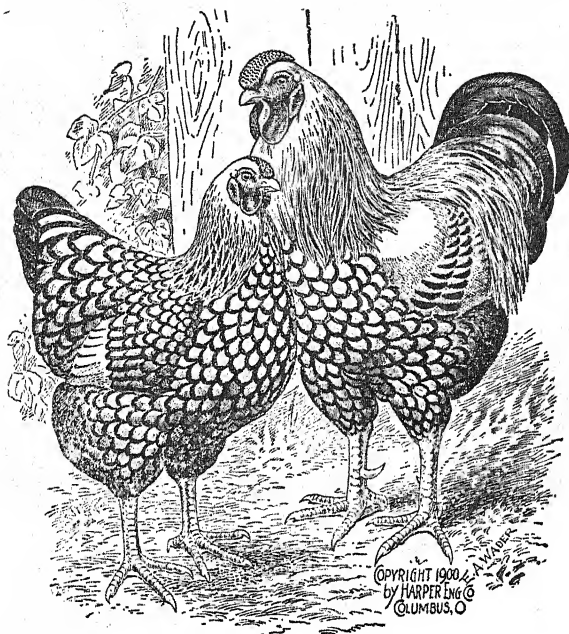
The Maharaja of Pithapuram has some beautiful white Wyandotte Bantams which he has bred himself and also some excellent Game Bantams.



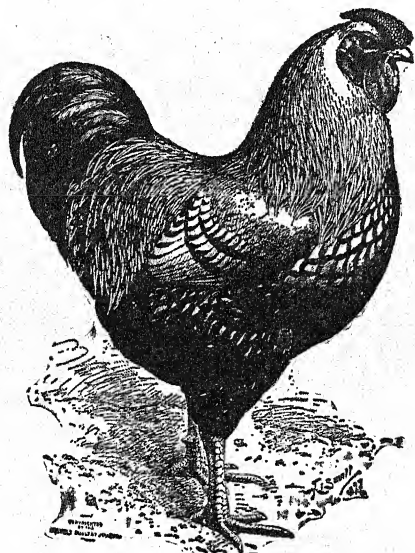
PAIR OF WHITE WYANDOTTE BANTAMS.
BRED AND OWNED BY MAHARAJA OF PITHAPURAM
FIG. 23A.



PAIR OF ASILS INDIAN FIGHTING GAME.
BRED AND OWNED BY MAHARAJA OF PITHAPURAM.
FIG. 23B.



PAIR OF SILVER LACED WYANDOTTES.
FIG. 24A.



SILVER LACED WYANDOTTE COCK.
FIG. 24B.

CHAPTER VII

BREEDING

If permanent success in poultry-keeping is desired, systematic breeding must be carried on. It is only by carefully breeding from the best birds that the great improvements in our domestic poultry has been attained. I would advise every poultry-breeder to keep a copy of "The Illustrated Book of Poultry" by Lewis Wright. The new and revised edition of Mr. Wright's book should be obtained. Also procure all the books on Poultry in India. You will receive some benefit from the experience of other successful breeders.

Breeding one's own poultry is much cheaper than buying them. They not only cost less money but the danger of infection caused by diseased imported birds is avoided. Then again, one is always sure of the blood or strain, as it is called, of the birds he breeds in his yard. The general rule is, "like will produce like", though this is not always absolutely true of every breed.

The Art of Breeding is governed by a few rules which are simple and easy to understand. These rules must be faithfully observed if any degree of success is to be gained:—

1. Select only the largest and best formed birds of the breed to breed from.
2. Never breed from weakly, sickly, stunted, mismarked or deformed birds.
3. Always select the best layers to breed from.
4. Never breed from cocks or hens under a year old or more than three-and-a-half years old. The best chickens are produced from hens two years old mated with cocks a year old, or hens a year old mated with cocks two years old.
5. The novice should never breed in—that is, the male bird should always be of a different family from the hens he

is mated with, though of the same strain. He should never breed from brother and sister. Father and daughters can be mated together, and mother and son, also; if the relationship be distant, the birds can be bred from with advantage.

It requires great skill and understanding to in-breed or line breed. Vigour is the main thing. *If both sides have vigour*, one can mate brother and sister with excellent results. Many of the most successful and experienced breeders whose strains are famous have produced the same by practising in-breeding. The novice, however, lacks this experience and therefore *he* should not in-breed.

6. To improve the breed, the hen must be mated with a cock that is superior to her. If the cock is inferior to the hen, the chickens will be inferior to their mother, but if the cock is superior to the hen, the chickens will be superior to their mother. An inferior cock will work ruin in a poultry-yard. It is much more economical to pay thirty rupees for a really good cock to mate with the breeding hens, than to buy an ordinary bird for that purpose and pay ten rupees for him. The cock must not only be a good one, but must be from good stock and properly bred. If he is not from a good strain or family, he will not produce good chickens.

7. To breed successfully, proper food and careful management are absolutely necessary.

The Parent's Influence—The male parent affects the external structure, shape, size and colour of the progeny, and the female parent influences the internal structure—the constitution, temper and habits. The egg-producing powers are transmitted from father to daughter and mother to son, hence the importance of breeding from a really good cock. All chickens from pure-bred parents will not come perfect in all points. Out of a dozen chickens probably only one or two will come up to anything like exhibition standard. Some will be defective in marking, some in size, some in shape, some in comb or leg. The Barred Rock and the Laced Wyandotte are difficult to breed up to standard perfection. They are:

not very old breeds and frequently throw back. Some of the Barred Rocks will come white, some black, some too light and some too dark. Some of the Laced Wyandottes will come with a little feather on the legs, or defective in marking, or with defective combs. The older breeds, such as the Cochin, Langshan and Brahma and birds of one colour such as White Leghorns or Black Minorcas are easier to breed true, but even they are sometimes defective. Perfection in any bird is the result of continuous care in selection and breeding for years.

Stock Birds.—In selecting a cock for breeding purposes, it is necessary to see, first, that he is of good size, has bone and plenty of flesh, not merely feathers, broad chest and erect carriage; second, that he has the right shape of his breed; third, that he has good colour; fourth, that he is active and young, but not under a year old; fifth, that he is perfectly healthy; sixth, that he is of good parentage—pedigree; seventh, that he has not been used too much and his powers exhausted. A pure-bred cock with these qualities will improve the birds bred in the poultry-yard.

In selecting a hen or pullet for breeding purposes, it is necessary to see, first, that she is of a good size, has bone and plenty of flesh but is not too fat, is broad and deep in chest and erect in carriage; second, that she has the right shape of her breed; third, that she is of good colour; fourth, that she is quiet and tame, active and young, but not under a year old; fifth, that she is perfectly healthy and has moulted quickly and is in no way deformed; sixth, that she comes on to lay early and lays a good number of large eggs; seventh, that she is of the same breed as the cock, of good pedigree, and resembles him in colour. A pure-bred hen with the above-mentioned qualities, when mated with the cock described above, is sure to produce some first-class birds.

It must be borne in mind that while the quality of the hen only affects the quality of her own progeny, the quality of the cock affects the progeny of every hen in the pen with

him. Not only the quality of the cock, but the quality of the progenitors of that cock, not for one only, but for many generations back, will affect the progeny of that cock. Hence, no care or money is wasted if wisely spent on the selection of a really good cock for the breeding pen.

Rigid selection is the only means by which the stock can be improved. Every year the best hens and pullets must be picked out of the stock and mated with the best cockerels and cocks. The cock should be of a different family from the hens he is mated with, though of the same strain or line. This should be done every year; and the defective and old birds either sold in the market or used for the table. If two or three separate pens of the same breed are kept, the cock of one pen can be mated to the pullets of the other pen, and the cockerels of one pen to the hens of the other pen. With two or three pens of the same breed, a judicious man need not go outside for fresh blood; he will have all the cocks and hens he wants for the most successful pedigree breeding for many years, and effectually avoid breeding with close relations. This method will insure a good and reliable stock of birds. In a properly managed yard, half the stock of birds will be bred each year, and a third of the old stock will be killed off or sold. A few surplus birds must be kept to fill the places of those that may have to be removed from the pens. Unless this is done, it will be impossible to keep up the efficiency of the stock. The cock used for breeding must, in every case, be a pure-bred one; a cross-bred cock must never be bred from.

Proportion between Cocks and Hens—Very large cocks must not be mated with small hens, and very small cocks must not be mated to large hens. Both birds must be of proper proportions and as large as possible in the large breeds, and as small as possible in Bantams. When one bird is too large and the other too small, the eggs are infertile, and the small hens are seriously injured by the large heavy cocks.

Number of Hens to a Cock—Not more than from three to four hens should be given to a Brahma or Cochin cock, the Rock, Langshan, Orpington and Game cock should have from five to six, the Wyandotte and Rhode Island Red from six to eight, but the Chittagong, Minorca and Leghorn need from seven to ten hens for each cock. As the hens finish laying and leave the run, others must be put in their place. Some cocks will take more hens than will other cocks of the same breed, and some cocks will not be able to serve half the usual number. The number of hens given to a cock depends upon the age and vitality of the male bird, and also the season of the year. Poultry generally begin to moult in July and August, and during July, August, September and even October, the cock birds are not so active as they are from November to April. The excessive heat during May and June is very trying and exhausting to some birds. The cocks and hens should be separated during the time of their moult, July to September, and also during the very hot season of the year.

Half the battle of rearing strong useful chicks lies with the parents, for the condition of the breeding stock, especially of the male bird is of the utmost importance, the birds must all be fully grown and in the pink of health and condition, neither too fat nor too lean. The best results are obtained when the male bird is removed from the breeding pen at the end of the season and kept by himself and well fed until he is wanted again. He should not be allowed, even during the breeding season, to remain for any length of time in the pen with the hens without a change. Some breeders keep two cocks for each pen of from six to ten hens, changing the male bird every week or perhaps every three or four days.

Too few hens are as great a cause of infertile eggs as too many, and the strain upon the hens is also very liable to cause them irreparable injury.

How to Manage Cockerels—As a rule, cocks begin to run

with the hens much before the time they should. If cockerels are put with hens before they are one year old, they are stunted and their progeny are not strong and large. Cockerels should be kept far away from hens and pullets in a separate run, shed and house, and properly fed and cared for until they are a year old, when they should be mated to selected hens.

Kept Separate—If more than one breed is kept, each breed must be kept separate and on no account allowed to run together. They must have separate houses, shed and runs. When different breeds are allowed to run together, all the birds are ruined and the progeny becomes worthless.

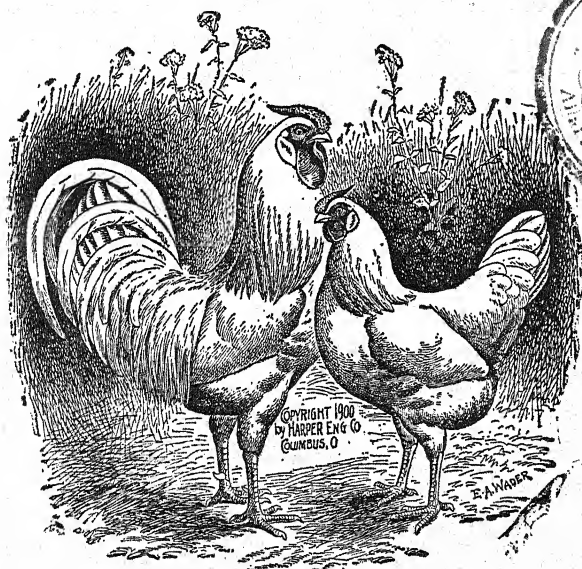
When a person has limited room and means, he should keep only one breed of fowls, and that a pure one. Keep a cock and from four to ten hens according to the breed. A few fowls can be easily managed and will yield a great deal of pleasure and profit.

When the grounds are large and the person can afford it, he should keep two or three separate pens of the same breed. When two or more pens of the same breed are kept, and the chickens of the separate pens are not closely related to each other, the cocks of one lot may be mated with the pullets of another lot and in-breeding thus avoided, but when all the fowls are allowed to run together, the cocks must be procured from elsewhere.

The Colony Plan—In a large run, enclosed with wire-netting, or in a garden or field, a colony of from twenty-one to thirty-three birds can be kept with very good results. The run should be at least from 300 to 400 feet long and 100 to 150 feet wide, with a house 10 feet by 15 feet in the centre, and a number of large trees around for shade. In such a run and house, three cocks and from eighteen to thirty hens can be kept satisfactorily. Such a number of birds cannot be kept in a small run. If two cocks are put with the hens in a small run, they will worry the hens and start fighting, but when kept on free range or in a colony in a large run as mentioned above, three cocks can be kept together with the hens. When

the grounds are large enough, the flock will, as a rule, split into as many portions as there are males, and each lot take to different parts of the run and live in peace. Before the cocks are put together in the pen, they should be kept together by themselves in a small pen and allowed to make friends. They must not be allowed to fight.

Mating For Colour—This is a very difficult subject to touch upon as it embraces such a large area that it is quite impossible to go fully into the subject. As buff seems to be the most difficult colour, we will just say a word or two about



PAIR OF WHITE ROSE-COMB LEGHORNS.

FIG. 25.

this popular tint, which has caused so much haggling and unpleasantness in exhibition circles. As everybody knows, the great bugbear in breeds of this colour is the persistency with which the black feather makes its appearance in the tail. We may breed from birds almost sound in colour, but the youngsters from them may show the black feather to an alarm-

ing extent. In mating up a pen of this colour, select a good level, deep=coloured cockerel, even if he does show a little black in the tail (also insist on the black feathers showing a tinge of buff in each one), rather than a so-called self=coloured bird of the "wishy=washy" type. It is advisable in this colour to have the male bird a deeper and richer shade than the female. Very often the buff runs too light and produces white. In some varieties, it is quite impossible to breed both males and females of good colour from the same pen.

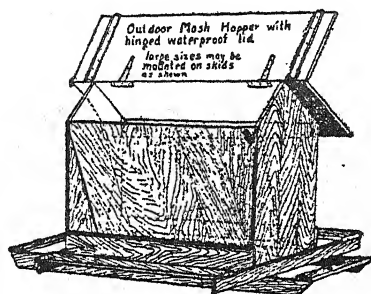
Cross-Breeding—Breeding cross=bred poultry needs skill, common sense and knowledge of the characteristics of the different breeds. All crosses are not good. Cross-bred fowls should not be bred from, they should be used for the table and for laying only. If they are bred from, their progeny will be sure to deteriorate. The first=cross is the best. By first=cross, I mean the progeny of a cock of pure breed and a hen of another pure breed. If the first=cross hens are bred from, they must be mated to another pure bred cock of the same breed as their father. The cross=bred cockerels or cocks must never be used for breeding.

There is very little advantage to the poultry fancier in producing cross-breeds. The pure breeds are very much more satisfactory both as layers and table fowls, as well as for exhibition. Their eggs and chickens demand a better price, and consequently pay better, while egg=production can be more easily kept up to the standard.

As a cottage industry the breeding of cross=bred fowls can be advocated. The method is a cheaper one, and one that will have a more rapid effect on the poultry of this country. The aim being merely to provide eggs and fowls for human consumption, the pureness of the birds is not essential while they lay well and grow to maturity rapidly.

Crowding—Another matter of very great importance is never to have too many fowls in one run or house. When fowls are crowded together, they will not lay well, and the eggs they do lay, if not infertile, will produce weak and

sickly chickens, not only so, but the fowls will soon become sick and die. Fowls should never be kept in the same house and run with ducks, geese or turkeys. If they are, they will be utterly spoiled.



MASH HOPPER.

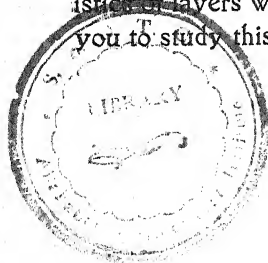
FIG. 26.

Care and feed.—A very great deal depends upon the care given to fowls and the food they receive. You need never expect to get good birds without good food and proper care. The best breed will soon deteriorate if neglected or badly fed.

How to know the best layers.—It is sometimes difficult to know the best layers among the hens. Those who keep only a few fowls and watch them closely can often distinguish the egg of each bird. But when many are kept this is impossible. It is always best to keep the hens from which you desire to breed separate from the common stock, and when this is done, it is not difficult to tell which of them are the best layers. An active, intelligent-looking bird, with a bright comb, will as a rule, be a better layer than a dull, lazy-looking hen.

The safest method is to use trap nests or separate pens. This nest is so constructed that as soon as the hen enters it, the trap-door closes down and shuts the hen in. After she has laid her egg, you liberate her. By this means you can tell how many eggs each hen lays in the year.

While trap nesting is the only absolute way of determining a fowl's laying ability, there are certain general characteristics of layers which are pretty well recognized. It will pay you to study this and then select your hens on such basis.



MEASURING CAPACITY, THAT IS DISTANCE FROM BREAST BONE TO PELVIC BONES.

FIG. 27.

In the case of pullets that have not as yet begun to lay, select those which show the best development for their age. Choose the birds that are well filled out, healthy, bright eyed, active, and vigorous. They should have long bodies, deep in back with plenty of room for egg producing organs, good stout legs for their size, and promise of proper comb and wattle development. Avoid the thin, sickly, shallow bodied, crow headed, sluggish or poorly feathered pullets.

If you are culling or selecting older birds that have laid before, you can learn almost as much about them by watching them as by handling. Choose the hens that moult late, that are friendly and industrious, first off the roost in the morning and last on at night. Their toe nails will probably be worn short with scratching, and their feathers soiled and

worn with work. They may not look nice and clean but will be workers and layers. Discard the nervous, flighty bird that sits on the roost much of the time, moults early and has a small rough comb, and deep yellow legs and beak at all times. Catch each fowl, handle her and study her. The greater the capacity, the better the layer. The pelvic bone measurement is taken to see whether a hen is in lay or not. If in lay, the bones will be wide apart.

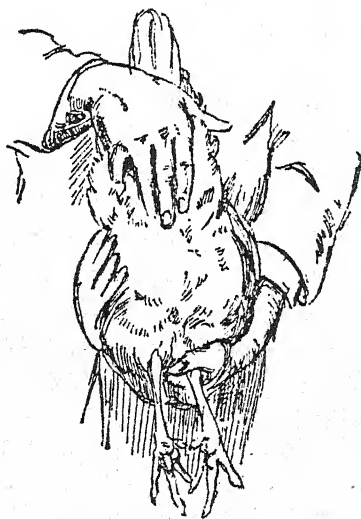
How to know the age of birds—An experienced hand can tell an old fowl at a glance, but it is rather difficult to impart this knowledge to a beginner, for no one sign is infallible. In general, the legs of a young bird look delicate and smooth, its comb and wattles soft and fresh and its general outline, even in good condition, rather light and graceful. An old one will have rather hard, horny-looking shanks, its comb and wattles look somewhat harder, drier and more "scurfy", and its figure is well filled out. Many of these indications even may be deceptive, especially as "dealers" have a way of making old birds look young. The only advice to give a beginner is to use his own powers of observation and try and detect the "old look".

Fat hens—The breeding stock must never be allowed to become fat. When a hen begins to grow fat, she will begin to reduce the number and size of her eggs. A very fat hen will not lay at all. A laying hen should be in good condition, not fat nor thin. When a hen is allowed to run light she will become ill and stop laying. Laying hens should be kept in a fair and hard condition. If the cock bird gets too fat, he will become dull and lazy, and will be useless in the pen.

The birds in the breeding-pens must be periodically examined, and if they are too fat, their food must be reduced. The birds must be made to take exercise and scratch for their food.

The scientific selection of breeding stock—In the selection of birds for breeding purposes, the aim of the fancier should be along the line of both utility and fancy, and his selections

made to bring about good results in each direction. As the development of one does not conflict with the development of the other, there is no good reason why any fancier should not build up a family or strain of birds that excel in both fancy and utility qualities. These qualities are of mutual benefit to each other, and a bird possessing both to a good degree is a better bird and worth more money than one that may be strong in one line and not the other. The utility qualities are mainly those of egg-production, size of body and quality of flesh for market purposes, while those of the fancy are confined to shape of body and colour of the plumage.

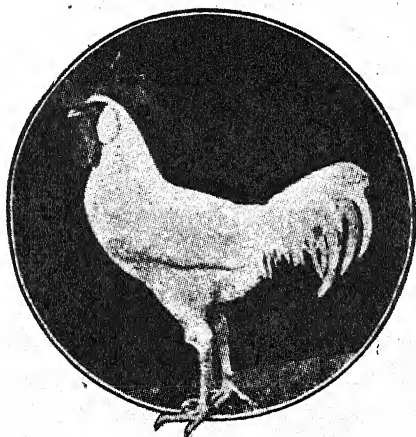


MEASURING DISTANCE BETWEEN PELVIC BONES.

FIG. 28.

In birds of all classes, except Bantams, good size is an important feature, and this is especially desirable in birds intended for market purposes. This practical feature is also one of equal value from a fancy standpoint. The breeder who raises birds for the market wants good size, and the fancier also desires good size, as it is a standard requirement. It is therefore necessary to select birds as breeders that are of

good size, and by size is meant a bird that will reach standard weight without being over-fat. An over-fat bird is never a good breeder, nor is it a desirable bird for the market. It is almost unnecessary to add that good health must accompany good size, and is an indispensable feature in any branch of the poultry-industry. In the matter of egg-production, the "fancy" should give its attention as well as "utility", as it is as important to the one as the other. A female may be of unusual merit as an exhibition specimen, but if she is not a good layer, she is of but little profit to her owner. It is the female that



EXHIBITION WHITE LEGHORN COCKEREL
FIG. 29.

combines the two branches of quality, that is of value. We all desire to raise as many chicks as possible from our best birds, and the number of chicks that can be produced from a female will gauge her value as a breeder—quality of chicks, of course, to be considered. The size and shape of the eggs laid by our hens is also an important feature. Some hens lay small eggs considering their size, and others lay eggs of poor shape, both undesirable features, as the pullets from such females are apt to have the same failing except as modified by the influence of their sire, which may have been a bird from a female that

laid an egg of good size and shape. Selections should be made of those females that lay eggs of good size and shape, and also in the selection of our male birds we should consider this matter, and, if possible, use such birds as are from females that are known to lay eggs of desirable shape and size. A few seasons of such selection and one would have a strain of fowls that would be of more than ordinary value as layers of large, fine-shaped eggs. It is, of course, necessary in order to know the eggs laid by each hen, to make use of some device that will enable us to ascertain this fact without any chance for mistakes such as the trap nest.

Make it a point to consider the size and shape of the eggs laid by a hen in selecting hens for breeding purposes. It is also a wise plan to consider the disposition of a bird in making selection, especially so in the choice of a male bird. Where possible, other qualities considered, select the one with a gallant, generous, active disposition, one that would give his last bit of food to the females of his pen and go without any himself—a bird that is always polite to his mates and is ever-ready to do battle in their behalf. A male of such disposition will get better chicks and more of them than the bird of surely disposition and lazy movement. It is well, also, to give attention to the disposition of the females; and as far as possible, select those of the active, energetic type. Those that are “hustling” around most of their time instead of sleeping on the roosts or in some comfortable spot make good sitters and mothers. It is not always possible to select birds that possess of all these desired qualities, but one can combine as many as possible, and each season endeavour to make the combination stronger, always working in the direction of the improvement of all these desirable qualities. It can be done if one will only give attention to it.

It is by the selection of the “best” in all respects that real progress is made. The ideal female should possess all these qualities to a great degree, and the ideal male bird should not only possess proper size, disposition, etc., but

should be the son of an ideal female. Some may say that we are getting beyond the realm of the practical into that of the ideal, when we ask for a combination of all these qualities in our breeding stock. This is not so, it is practical and possible and only requires the attention of the breeder along this line to bring it about. No one of these good qualities will conflict with another. The selection of our breeding stock should be made with a consideration of all factors that may have an influence in developing and establishing all good qualities in the blood of our birds.

Influence of the male bird—The breeding of fancy poultry has been gradually growing out of the realm of the theoretical into that of the practical, and the work of our best fanciers has brought it to a point where it may rightly be termed a science, and if one would achieve the highest success, it must be considered as such and made a study not in a superficial way, but in a thorough, earnest manner, by watching the results of every move, of every effort, and tracing out the conditions and elements that have been the cause. Along this line let us consider one of the important factors of the breeding problem, and that is the "influence of the male bird," and how it may be controlled so as to bring about the best results.

A male bird to be considered desirable as a breeder should have an ancestry of undoubted good quality, a line of birds that have demonstrated their ability of transmitting their good qualities to their progeny. It is as necessary to work for the establishment of this "breeding tendency" as it is of any feature that pertains to quality alone. No matter how much quality of form and plumage a bird may possess, he is of but little account as a breeder if he has not the power to transmit it to his progeny. Individual excellence is a very desirable feature in all breeding stock, but if it is not accompanied by a power to transmit it to their progeny, it is of but little use in the breeding yard. It is results that tend in the right direction that we are after in our work of the

breeding season. A male bird that is possessed of individual excellence and also the power to transmit it to his progeny is a valuable bird for breeding purposes. When such a bird is in our possession, his blood should be used as largely as possible, so that a line may be established that will be most desirable in quality and breeding influence. It is the male bird that introduces the "life element" into the egg and every chick from the mating of which he is the head is of his blood. Not only does he introduce the life element, but by so doing he brings into play the influence of the female also, which, in many cases, may be superior to his own and the chick may follow after the hen in point of quality and character. So that while the blood of the male bird enters into the life of each chick, it by no means follows that it will be the controlling influence, and will impart to the chick its own excellence, as it depends upon which parent will be the stronger in the power to transmit the qualities of form and colour. A male bird that is mated to several females oftentimes will vary much in the extent to which his influence will be noticeable in the chicks of the different females and this variation will be caused by the difference in the breeding influence of the females. Some of them may be stronger in this respect than the male bird, and others weaker. The chicks will naturally develop in quality along the line of that of the stronger parent. Where the male bird is the stronger in this breeding tendency, the cockerels will more nearly resemble him in form and colour and the pullets will also show his influence by their resemblance to his female relation, his mother or sisters. In the case where the female is the stronger, the cockerel will show a family resemblance to her sire or her brothers, and the pullets will more nearly resemble herself or her female relation. The stronger-blood influence will tend to produce a quality in keeping with that of the family of the bird exercising such influence. As to which parent possesses it, one cannot tell until the chicks have developed sufficiently to show their quality of shape and colour of

plumage, when one can tell which family the chick most resembles. There are cases, however, where some unknown influence seems to step in and produce a result that is at variance with the characteristics of either family. Where such result is not pleasing in the quality it presents, the breeder had better discard the mating of the male bird with that particular female. Where one makes use of both males and females that tend to the production of the same character of quality, it does not matter so much as to which side shall exert the greater influence, as in either case it should be in the right direction. But where one wishes to produce and continue certain good qualities that are possessed most largely by the line of blood from which the male bird has descended, then it is important that he possesses the stronger breeding power, so that these qualities may be transmitted to his chicks. Even where the male bird possesses stronger power to influence the quality of the chicks than any of his females, these females will vary in the strength of their influence, and to what extent, can only be told by a comparison of their chicks. To do this with any degree of certainty, one must breed in pairs, so that the eggs laid by each female may be known and marked. This would necessitate placing each female by herself and giving the male bird the run of the pen a short time each day, or every other day, or better still by the use of "trap nests." This last plan would be the easier, and would allow all the females we might wish to mate with any certain male to run together and would economise both space and time. The mating in pairs is really the only scientific way of breeding, as it is the only way in which one may determine to a certainty the parentage of each chick and by a study of the quality and characteristics of the chicks, be able to determine which side has the greater influence in the production of the qualities they possess. In the breeding of most lines of livestock, the work is done in pairs, and it is no trouble to determine parentage. But in the case of fowls, where the

young breaks forth from the egg into the life of the poultry world, it is necessary to mark the eggs of each female, and set them so that when the chicks hatch they may be given a mark that designates them as the offspring of a certain male and female. It is the only method by which one may with certainty arrive at a knowledge of the parentage of each chick. It may seem to some fanciers that all this work is

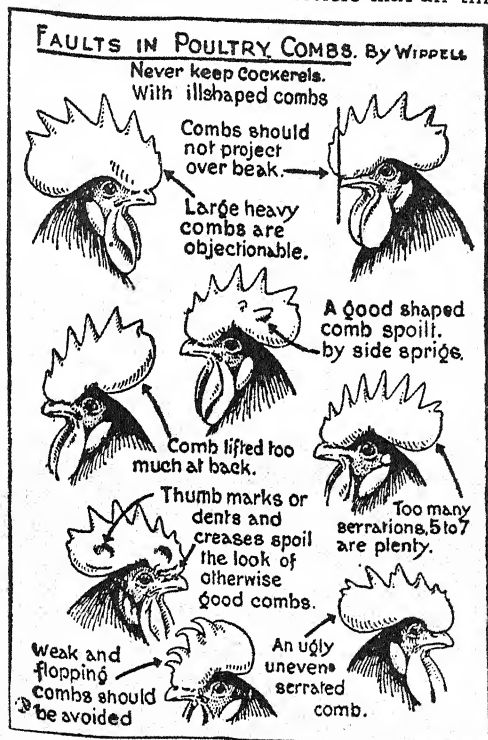


FIG. 30.

unnecessary, and is carrying the breeding of "chickens" to a useless extent but to the "genuine fancier", the one who makes use of his brain as well as his hands, such work will be recognised as the only line that gives results that may be studied and the influences that have brought them about located to a degree of certainty that is impossible under the

old style of breeding. Many men are in the "fancy" for the pleasure it affords them, men of brains and intelligence, to whom the scientific method would appeal as the one most apt to give the pleasure they seek, and would call for the exercise of the mental as well as the physical faculties. Dame Nature does not give up her secrets easily, and when it comes to the matter of the various influences that possess such power in shaping the results in our efforts in the breeding of fancy poultry, it is necessary that we be able to locate and, as far as possible, control them, and a method or plan that will enable us to do this to the greatest degree of certainty is the one that will admit of the greatest progress.

As the male bird must exert great influence over the quality of his chicks, because of his blood entering into the life of each, it is very important that he possesses qualities, individually and through the blood of his ancestors, that are of the kind we are working to establish in our strain. There is such a difference in the breeding tendencies of the birds of different strains that the only safe way for one to do is to establish a strain of his own and introduce new blood carefully and from a strain that is bred along the same lines as his own—then the danger of conflicting influences will be reduced to the lowest point. One should settle upon the type of a bird he wishes to produce and the style of colour and stick to them. It, of course, being supposed he will make this choice according to the demands of the standard, and aim to produce a bird that will meet the requirements to as great a degree as possible. In many fanciers' yards one may find several types of birds, in both shape and colour, and no system seems to prevail. This is not as it should be, as our efforts should be directed along definite lines. The breeding of fancy poultry is becoming more and more of a study to our best breeders, and their aim is to gain all knowledge possible concerning the many influences that enter into the question of how to bring about the best results in our breeding operations. If these influences cannot be controlled, then only a certain degree of

success is possible, and we may not expect to produce birds beyond a limited degree of quality. With such influences brought under control, the limit to quality will depend upon the efforts of the individual fancier and the amount of study he will give the subject. If he looks upon it as a science and considers no part of it as beneath his efforts, he will most likely be successful to a degree that will well repay him for the time and study he has given the subject. One cannot expect to get much for nothing and anything worth having is worth putting forth some effort to secure. This is as true of the poultry industry as of anything else, and he who expects to produce birds of high quality must also be willing to master the science that will give the knowledge that will enable him to produce them.

An egg type—It is a disputed question whether such a thing exists with fowls as an egg type. Observation, however, leads us to believe that the best laying fowls do differ from other fowls of the same breed that are not such good layers. They differ in characteristics that are to be recognised by one who is familiar with his fowls. Theoretically it is perfectly natural and plausible that the pronounced development of certain functions would call for a harmonious structural development of the individual to support this function. For instance, the function of speed is accompanied with lightness of body, high nervous energy, great endurance and pluck and a striking adaptability of size and shape of bone and muscle to do the work demanded with the least waste of energy. In short, it is simply the result of the silent working of the great law of adaptation which has made the pronounced type in all of our breeds. This has been hastened and sometimes hindered by the hand of man. The contrast between the race horse and the draft horse, the milch cow and beef cow, the greyhound and the bull-dog, the Mediterranean fowl and the Asiatic is but another evidence of the relation between type and performance. These types do not simply happen so; they have

gradually developed to be the best for the purpose. When a hen is born with parts better adapted to egg-production than any hen heretofore, she will, with proper care and food, make the largest record. This sounds like a self-evident truth and it undoubtedly is. So is an egg type, but the egg type does not mean body-shape alone. That's where most failures occur in selection. We must remember that shape is only a factor in the productive



PAIR OF BUFF LEGHORNS.

FIG. 31.

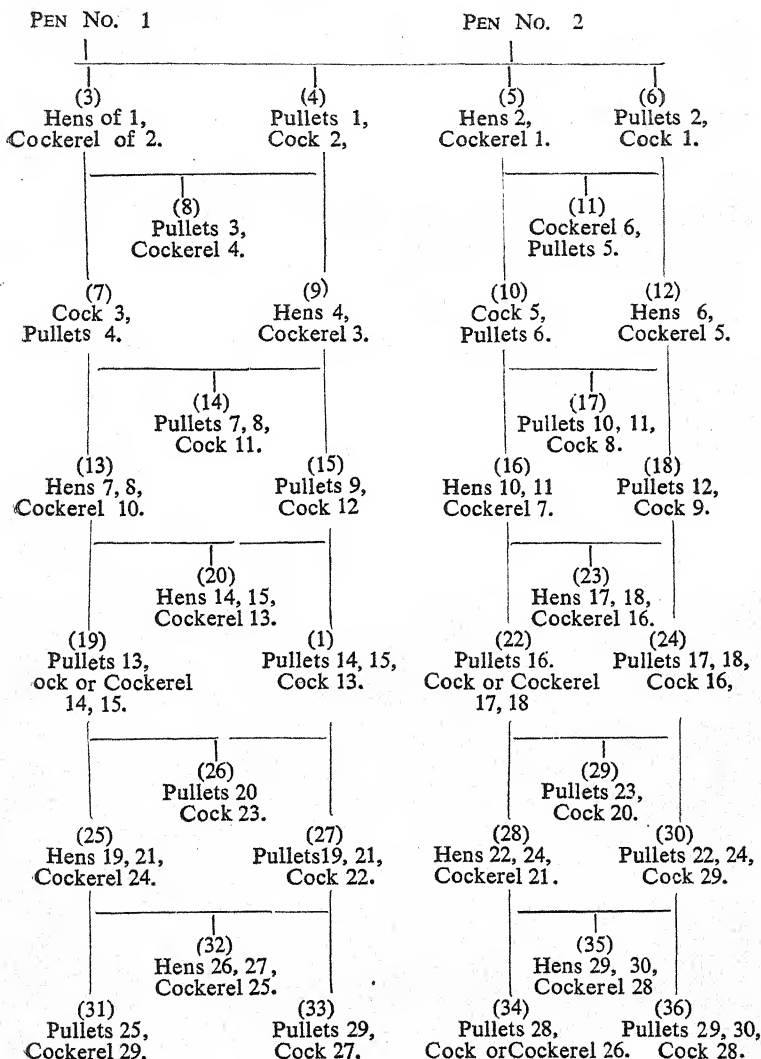
power of an individual. A hen may be perfect in form and still be a poor producer, through not inheriting a high reproductive tendency; just as a locomotive may be perfectly formed in every part to make great speed, but may fail because of poor metal. Some hens with perfect form and inherited prolificacy to be large egg-producers may fail, on

account of lack of vitality and vigour of constitution, to withstand the drain upon the system. When, however, these qualities are combined in one hen, we get the highest production. Such a hen will differ in characteristics which will distinguish her from other hens of the same breed which are not good layers. She will have the egg-laying type. Most poultrymen who have observed the hens that are found most often on the nest and have been accustomed to selecting their breeding pens with this end in view, will agree with the statements that have been made. They can quite accurately separate the best layers from the poorest layers. Those breeders who have never before given it a thought, or who do not believe in egg type, should try selecting a pen of the best layers and save their eggs to breed from, and see for themselves whether they do not get a finer lot of laying fowls than they ever had before. The first thing that should be looked for is a fowl that is large and that has a strong vigorous constitution, without which all else is for naught. You will observe the long rangy back and the extreme depth of body from back to keel, and particularly the large fluff. The whole structure indicates at a glance a large development of the egg-producing machinery, and a great capacity to supply this machinery with digested food. There is a decided effeminate, motherly appearance in a good layer in direct contrast to the rooster-headed, thick-necked hen. She is generally very active, inquisitive and friendly, which all speak for great development and intelligence. According to the correlation of parts, she will have a large comb. The condition of the comb is closely related to the strength and vigour of the egg machinery. A good layer will usually have a short stout beak, avoid a hen with a head like a crow. She will also have a bright, bold eye; also short toe nails, indicating that she is active in scratching for food. She will be the first to leave the perch in the morning and the last to go to roost.

A good layer will have good capacity, as shown by the distance between the end of the breast bone to the pelvic

PEDIGREE

Proper Method of Pure Breeding. Begin with two Pens of Fowls.



PEDIGREE CHART.

FIG. 32

bones. <See Fig. 27>. Measure this with your fingers. Thus we speak of 3, 4 or 5 finger capacity. The pelvic bones also will be fine, not coarse. The greater the distance between them, the better the layer. <See Fig. 28> Measure it. This method of selecting the good layer is known as the handling method. The distance between the pelvic bones will be found to vary from one to five fingers breadth.

CHAPTER VIII

EGG PRODUCTION

How To Increase Profits—Profits in poultry-keeping are largely affected by the number of eggs produced in the cold season, i. e. autumn and winter, as prices are highest then. The larger profits can be best obtained by hatching early and by having early maturing strains. The laying stock should also be of high bred-to-lay quality. Utility breeds will do better than exhibition or "show birds". Utility white Leghorns, utility Minorcas, utility Rhode Island Reds, and New Hampshires can all be recommended.

Factors of management, such as housing, sanitation and keeping the flock free from disease, are important in getting best results. To feed efficiently is also essential.

To keep up the egg production, great care should be taken in selecting the good producers and culling the poor layers.

Culling The Laying Flock—Laying flocks should be culled thoroughly at least once during the summer or early fall (autumn). The object of culling is to remove the poorest layers and to select the best for breeding purposes the next year. The method of banding birds with cheap celluloid leg bands can be taken advantage of at this time.

Culling should be done thoroughly in order that no undesirable specimens shall be left in the flock. Each bird should be examined individually both in respect to physical condition and from the standpoint of the colour and quality of the flesh. When the bird is in good laying condition, the combs and wattles are naturally bright red. Good layers have combs that are large, bright red and glossy; whereas, poor layers have dull, shriveled and scaly combs. In normally yellow shanked birds, as Leghorns, Rhode Island Reds and New Hampshires, the shanks of poor layers or of layers that

are taking a long rest are usually yellow and the beaks tinted with yellow ; whereas, the beak and shanks of heavy layers are usually white. The pubic bones of a good layer are usually thin and flexible and when the hen is in laying condition, they are wide apart. In the poor layer, they are frequently thick and rigid ; and when the hen is not in laying condition, they are relatively close together.

The handling quality of layers is also an important point in culling, and that of the skin serves as a good indication of laying ability. In a good layer, the abdomen is enlarged, the skin over the body is soft and pliable, and the vent is moist. In a poor layer, the abdomen is contracted and hard and the skin feels coarse and thick.

One other important factor to keep in mind in culling is the time of the moult. Poor layers moult earlier and much slower than good ones. Poor-laying hens may begin moulting as early as July, whereas heavy layers generally do not commence to moult before September or October.

Culling is an economic feature in the proper management of the farm flock, because, if done early enough, it will save considerable cost in feeding the birds. The culled or discarded birds should be disposed of. Another distinct advantage of culling is the material improvement in the breeding quality of the flock.

CULLING CHART

CHARACTERISTICS IDENTIFYING LAYERS AND NON-LAYERS (HENS)

<i>Part of body</i>	<i>Laying Hen</i>	<i>Non-Laying hen</i>
Comb	Large, red, waxy, full	Small, pale, scaly, shrunken
Beak	Bleached or bleaching	Yellow or growing yellow
Eye	Bright, prominent	Dull, sunken
Eye ring	Bleached	Yellow-tinted
Pelvic bones	Flexible, wide apart	Stiff, close together
Abdomen	Deep, soft, pliable	Shallow, hard, tight
Vent	Large, moist, bleached	Small, puckered, yellow

CHARACTERISTICS INDICATING AMOUNT PAST PRODUCTION

(6-12 months of age)

<i>Character</i>	<i>Good Layer</i>	<i>Poor Layer</i>
Beak	Completely bleached	Yellow or growing yellow at base
Eye ring	Bleached	Yellow
Ear lobe	Bleached	Yellow
Shanks	Bleached	Yellow
Moult	Late, fast	Early, slow
Plumage	Worn, soiled, tight	Glossy, slick, loose
Broodiness	Seldom	Often

CHARACTERISTICS INDICATING ABILITY OF MATURE PULLETS TO LAY

<i>Character</i>	<i>Good Pullet</i>	<i>Poor Pullet</i>
Temperament	Alert, friendly, active	Dull, listless, wild
Weight	Heavy	Light
Health	High vitality, fat, free of colds	Low vitality, thin, colds
Pigment	Yellow shanks, beak	Pale shanks, beak
Back	Wide, long, straight	Narrow, short, tapering
Ribs	Long, good spring	Short, lacking spring
Head	Large, deep, strong	Shallow, weak, crow-head or coarse
Face	Neat, clean-cut, refined	Coarse, beefy, wrinkled or thin
Eye	Bright, prominent	Dull, sunken
Beak	Short, stout	Long, thin
Skin	Soft, thin, loose	Coarse, thick, tight or very thin

The above culling chart is taken from The Mid West Farm Handbook, 1957, by the staff of Iowa State University, Ames, Iowa from Section 5, Poultry.

Feeding laying stock—There are several different systems of feeding laying birds (see chapter on Food) but the diet should consist of mash, grain, plenty of green food, meat or fish meal, crushed limestone or oyster shell, grit and water.

The following is a good formula used widely for farm flocks in the U. S. A.

Ground yellow corn (maize)	...	...	25.0	per cent
Ground oats or wheat	...	...	10.0	" "
Ground corn, wheat, barley or grain sorghum (juar)	...	...	9.0	" "
Alfalfa leaf meal	...	...	5.0	" "
Soybean meal	...	...	24.0	" "
Peanut meal or soybean meal	...	...	10.0	" "
*Meat meal	...	...	4.0	" "
*Dried whey	...	...	4.0	" "
Steamed bonemeal	...	...	5.0	" "
Ground limestone or oyster shell	...	...	2.5	" "
**Manganized salt	...	...	1.0	" "
Vitamin A and D feeding oil	...	...	.5	" "
				<hr/>
				100.0 per cent

*In India, if one does not want to feed meat, fish meal may be substituted. If dried whey is not available, dried butter-milk or dried milk powder may be substituted.

**Manganized salt may be made by mixing 100 lbs. of dairy or table salt with 3 lbs. of finely pulverised technical and anhydrous manganous sulphate

Any one of the grain rations for growing chickens may be used for laying hens. The consumption of grain and of mash should be about equal. Feed consumption of laying hens varies with body weight and egg production.

A 5-pound hen laying 100 eggs per year will eat about 87 lbs. of feed per year.

SEVEN WAYS TO GREATER EGG PROFIT

1. Confine laying flocks.
2. Provide clean dry floor litter.
3. Provide clean, dry nesting material.
4. Gather eggs frequently, at least 4 times a day in hot weather.

5. Gather eggs in wire baskets.
6. Cool eggs before packing and keep them cool.
7. Maintain proper humidity in storage rooms.

Wire baskets for collecting eggs are the best because they permit free circulation of air to cool eggs rapidly. The use of pails, boxes or baskets are not recommended because they do not permit the eggs to cool quickly.

A refrigerated room is, of course, ideal for storing eggs, but in India this is usually not available. Do the best you can. Choose the coolest place you have and maintain a high humidity in it to control evaporation or drying of the egg. Room temperature should be 50-70 degrees and humidity, 70 degrees.

To produce high quality eggs for the market, be sure to produce *infertile eggs only*. This is most important, especially in a hot country like India. Remove all male birds from the breeding flocks after the hatching season is over. It has been proved that the hens will even lay better if no males are present.

ETAH, U. P.—Word just received from Etah, U. P., India states that the Slater Poultry Farm (formerly called the Mission Poultry Farm) is using the following feeding ration and getting good results.

Yellow maize.....	25
Jowar.....	20
Rice Polishing	
<low fibre>	15
Ground wheat <or low	
fibre wheat bran>.....	4
Fish Meal.....	3.5
Groundnut cake.....	25
Penicillin mycelia	5
Mineral mixture.....	2.5



CHAPTER IX

EGGS AND HATCHING

Eat More Eggs—Let us start this chapter by mentioning the importance of eggs in the diet of human beings. They are an excellent source of high quality proteins and are rich in iron and phosphorus. Egg yolk is a very rich source of Vitamin A, which is so important in human health. The yolk is also rich in Vitamin D which must be present in children's diets for proper bone development and for preserving health. The important member of the Vitamin B family called *biotin* is also found in the yolk. Biotin stimulates growth. Eggs contain some thiamin and are a good source of riboflavin, the growth promoting vitamin. Other important vitamins are also present.

In 1948, the average annual consumption of eggs per person was only eight. In 1958, in the United States, it was 348. Undoubtedly more eggs are being eaten in India today, for there is a large and growing demand, but even so, the number will be very small.

Why not keep a few high producing hens and have your own? Read Chapter VIII carefully, i. e. "Egg Production". You need not keep any cock. The eggs will then be infertile. You can eat them and no life is taken.

Americans realise their nutritive value. Before World War II about 3 billion dozen eggs were produced in the U. S. every year.

When Hens Lay—Hens usually begin to lay in February or March and continue laying, with a few intermissions, until July or August when they go into moult. The hens usually begin to moult in July or August and get through it in September or October. During this time they should be separated and not forced to lay. Some hens lay during

October, November, December and January, but not many will do so. By careful breeding fowls can be made to lay in October, November and December. The price of eggs is highest during the cold season, and it is a decided advantage to the owner to be able to put eggs into the market at this season.

Pullets generally begin to lay when they are from six to nine months old. Birds hatched in December, January, February and March will begin to lay in October or November. Pullets hatched in April, May and June will begin to lay in January to March. Those hatched in October and November will lay in May and June. The second year these hens will begin to lay a month or so later than they did the first year, and birds above two years old will not begin to lay until February and March or later.

Chickens hatched in January, February, March and April will be ready for market in the cold season, when they will sell for better prices.

The Best Time to Set Hens—The best time to raise chickens altogether depends upon the climate in which the chickens are to be raised.

The best time in the hills and cold climates will be the worst time in the Punjab and Uttar Pradesh, and the best time in the Uttar Pradesh, will be the worst for some other places where the climate is very wet and damp.

There are certain parts of India, such as the Punjab, Uttar Pradesh and Madaya Pradesh where the heat is very great and fatal to chickens, but the rainy season is most favourable to them, as the rainfall in these parts is not so heavy. There is also sufficient green food and insect-life for the chickens. The hot winds during April, May and June kill a large number of chickens, but they will do very well in July, August and September. March, April, May and June are the most favourable months for raising chickens in places like Simla, Naini Tal, Mussoorie, Darjeeling, Assam, Dooars and wherever the cold is very severe during the cold season, and the

moisture great during the rains. In Eastern and Lower Bengal, Tirhoot, and all parts of India where there are no westerly hot winds, chickens can be raised most successfully from October to the end of March.

Chickens raised during April, May and June thrive very well in places where hot winds do not blow, when sufficient shade and green food are provided and perfect liberty allowed. During this period large numbers can be raised and kept at night in open sheds, but care must be taken not to overcrowd the birds or keep them too warm. It is not advisable to hatch chickens in Bengal during the hot weather except in the cooler parts of the province.

Chickens hatched during the first three months of the year grow large enough to take care of themselves during the rains, the only special care they need is to keep them out of the water and storms. They grow rapidly during June, July and August, and commence to lay from September to November.

Wherever the rainfall is not heavy—does not exceed from 40 to 50 inches during the year—chickens can be most successfully raised from the 15th of June to the end of August, if the hens are not moulting. A few years ago the rainy season was considered to be very unfavourable to poultry raising, but on close investigation and experiment the following conclusions were arrived at :—

The rainy season must be a suitable time to raise chickens because :—

1. Most birds in their wild state raise their young from the 15th of June to the end of August. They go into moult in September and are through by the end of October.

2. During the rains there is plenty of green food for the birds.

3. During the rains there is a great deal of animal food natural to poultry.

4. During the rains the trees and shrubs are in full foliage and afford sufficient shade and protection to the birds.

5. During the rains many of the hens, especially the Indian breeds, lay very well and the eggs are very fertile.

6. Chickens raised at this period grow fast and become large and strong enough to go through the cold season.

All these conditions are in favour of poultry raising. The only things to guard against are the frequent showers and heavy rains. The chickens have to be taken up into shelter immediately it rains, and as soon as the rain stops and the ground is dry again they can be allowed out once more.

Eggs are very fertile during the rains and the chickens hatch out well. But very special care is needed to protect the little ones from chills and at the same time not to keep them confined too much. Those who raise chickens during the rains must provide a good large covered run and shelter for the birds. It is always a good plan to hatch some chickens during July and August, if possible.

Chickens hatched from October to the end of January do very well in all parts of India except the hills, if they are given proper warmth and more nourishing food and are carefully protected from the cold winds and from wet and damp. January, February, March and April are the most favourable months of the year and chickens can be raised successfully in the plains in nearly all parts of India.

The climate varies very much in different parts of India, and the best time is not the same time in every place. Raise your chickens at the time of the year best suited to your climate, but give the birds rest while they are moulting. Do not set the eggs of birds that are in moult and never set a hen that has gone into moult.

Selection Of Eggs—The selection of eggs for setting is a most important matter, for on the eggs depend the qualities of the forthcoming brood. The following rules must be faithfully adhered to:

1. Only eggs from the best hens must be set.
2. Only fresh eggs must be set. By fresh is meant, eggs

not more than three to five days old in the hot weather, and not more than seven to ten days old in the cold season.

When kept under proper conditions, eggs can be kept for eighteen to twenty-one days during the cold weather, and when set, will hatch successfully, but such eggs should be set under hens and not placed in an incubator.

Fresh eggs, if all is well, hatch out in good time and the chickens are strong and lively. The stale ones hatch later and the chickens are often too weak to break the shell. Even when stale eggs have hatched, subsequently deaths sometimes occur in this portion of the brood. When all the eggs are fresh, the chickens hatch out within a few hours of each other and losses are few.

3. Very small and very large eggs should be rejected. Only eggs of an ordinary shape and with a smooth surface should be used for hatching. Different breeds of fowls lay different sized eggs, but the size of the egg does not always indicate the size of the fowl it will produce. The Leghorn and Minorca lay the largest eggs although they are small fowls. Brahmas and Cochins, while being the largest fowls, lay rather small eggs. Larger eggs than usually laid by the fowl should not be selected for hatching. Very large eggs are generally double-yolked and very small ones sometimes yolkless.

4. Eggs intended for hatching must not be shaken, exposed to the sun, kept in wet or damp places, or placed in water. No oil, dirt or other liquid substance must be allowed to touch them, and they must be kept away from strong and bad odours. The eggs must never be kept in an air-tight vessel.

5. If a breeding pen is not properly mated, the eggs from that pen will not be a success. A badly mated pen will produce weak and otherwise defective chickens.

6. There are many theories abroad about being able to tell the sex of the chickens in the eggs, but none of these theories is proved by facts. The most plausible idea is that

the first half of the eggs laid are female and the second half of the number laid are male, but even this is not correct. Some people will tell you that the long eggs will produce males and the round ones females. Such ideas only reveal the ignorance of those who entertain them.

Several instruments are now on the market for the purpose of determining the sex of the chicken in the egg. Even these cannot be depended upon. Sometimes they are right and sometimes they are wrong.

Selection of the mother—Pullets of the first year, usually, are not good sitters and mothers. The second time a hen becomes broody, she will usually sit well and be a good mother. A wild, quarrelsome or fidgety hen will make a bad mother.

The hen selected for sitting must be in perfect health, and have all her feathers on her. A bald hen or one minus some feathers or in moult should never be selected for hatching, for she will not properly cover her eggs. The hen should be examined to see that she is free from lice and disease.

The hen should be thoroughly broody. A broody hen can be recognised by her constant determination to sit in her nest. She will scarcely go out to eat and will make a peculiar clucking sound and ruffle her feathers when she is touched. Many persons put eggs under a hen when she is not properly broody, and consequently the eggs are destroyed. Some hens will sit in their house for days, but when put on eggs are very troublesome, and will stand on the eggs and often break them. Such hens must be avoided.

Hens will sometimes lay several eggs after beginning to sit. Every egg placed under a hen should be marked distinctly so that the egg laid in the nest may be detected and removed.

The best time to set a hen is at night, as then she is more likely to settle down to her work. Besides, if the eggs are put under the hen at night, the chickens are more likely to

appear on the night of the 21st day, and will have the whole night to rest and gain strength.

Purchasing broody hens—When you have to buy a broody hen, you should buy one that has been set on eggs and been sitting for three or four days. Buy her together with her nest and eggs, place her nest in a quiet place, and let her sit for a day and night undisturbed. Place food and water near her. After she has been sitting for twenty-four hours, remove her common eggs and put the good eggs under her. It is a good plan to allow a hen to sit on common eggs for a day or two before giving her good eggs.

The nest—The nest on which the hen is placed must be made in a quiet corner where she will not be disturbed. Make a box twenty inches high and fifteen inches square. The top and sides must be made of half-inch mesh wire-netting, and the bottom and lower part of the sides of planks with a door made of half-inch mesh wire-netting, fifteen inches square, on one side. Put five inches of fine dry earth or ashes in the box, make an oval excavation and cover this with a thin even layer of soft broken hay. Place the eggs on the nest in this box and gently put the hen on the eggs and close the door. In such a box as this the hen and eggs will be safe from the other fowls and from cats and rats, and she will have plenty of ventilation. The box should be thoroughly rubbed over with kersoene oil and then well whitewashed both inside and outside. Flowers of sulphur or insect powder should be sprinkled over the nest once or twice a week. Great care must be taken to prevent lice infesting the box and nest.

Another way of making a nest is this: take a small *gumla* or earthen vessel about fifteen inches in diameter and eight inches deep. Fill it three-quarters full with finely sifted dry earth or ashes, press down and make a hollow, like the inside of a saucer, sprinkle some flowers of sulphur over the nest, and put the eggs on this, gently place the hen on the eggs and leave her alone. The nest must be placed where the hen

will be safe from cats, rats, etc. and away from other fowls. Great care should be taken to provide a nest just large enough for the hen to properly sit in. The nest must not be too large, or else the eggs will roll away from under the hen and become chilled and spoiled. If the nest is too small, the hen will crush eggs in her effort to get in and out of the nest and in turning the eggs. If the nest is only large enough for the hen to cover comfortably, she will sit properly and and treat the eggs well.

It is always best to have a separate house for sitting-hens. If they are kept in the same house as the other fowls, or where they will be constantly disturbed, they will not sit well and will spoil their eggs. If two or three hens only are put on eggs, they can be kept each in a different outhouse or godown and be let out once or twice every day. But if a number of hens are set, it is advisable to have a separate house and run for the sitting-hens, and place all the nests in this house. The nests should be placed at least six feet apart. All the hens can then be let out of their nests together and put back in half an hour.

A sitting-hen must not be kept in a damp, dirty, draughty or badly ventilated place.

How to treat sitting-hens—Before putting the hen on the eggs, she must be placed under a *tappa* or basket and fed and watered, and a plentiful supply of good grain must be given. It is a good plan to set a hen on half a dozen common eggs, and allow her to sit and settle down for two or three days, when the common eggs should be removed and the good eggs placed under her. This will ensure the safety of the good eggs. She must be allowed to remain undisturbed for about twenty-four hours after she is placed upon her eggs. On the second day, and every subsequent day, she must be allowed out once or twice a day. Some hens leave their nests twice a day. It will do no harm if she does, as long as she is not allowed to keep off her eggs for more than ten to twenty minutes each time.

The hen must have a plentiful supply of good whole grain, wheat or paddy, and pure water, but no soft food. The food must be given when she comes off her nest and never given in the box. If the food is given at a regular hour every day, she will come out exactly at that hour. A box of dry earth or ashes must be kept in the yard, where the hen can easily get to it. After she has eaten she will take a dust-bath and rid herself of the vermin that may be troubling her. Unless a dust-bath is provided, the hen will get covered with vermin. If the hen keeps away from her eggs longer than twenty or thirty minutes in the hot weather and ten or fifteen minutes in the cold weather, gently drive her into her box or room and close the door.

Hens ought to come off their eggs at least once every day. They require the few minutes run and daily supply of food. The temporary change from the cramped position is good for them and the exposure to the fresh air greatly benefits the eggs. If the hen will not come off her nest, she must be gently lifted off at a given hour every day. Unless this is done, both the hen and the eggs will be injured. The person who lifts the hen must carefully feel under her wings before removing her from the nest, in order to make sure that no egg is being held there. She must be lifted gently, by placing both hands under her wings.

When the nest and hen are treated with flowers of sulphur or insect powder regularly once or twice a week, they will be perfectly free from lice. If the hen is troubled with lice, her nest and box must be changed, and some insect powder and flowers of sulphur must be sprinkled over the new nest and rubbed under the hen's wings and over her head and back.

Your success with the eggs depends in a very great measure upon the hen under which you put them. If during the first three days the hen does not sit properly, the germ will not form. If about the middle of the period of incubation the hen neglects the eggs, they will be added, if at the

latter part of incubation the hen fails, the chickens will die in the shell. Infertile eggs will remain clear like new-laid eggs. If an egg becomes rotten, then be sure it was fertile but has become addled. Some hens will spoil every egg placed under them. Some hens in turning their eggs fail to properly cover one or two eggs in the nest. The next time they turn them, they take the exposed ones in and allow one or two others to remain uncovered. In this way, they will spoil every egg in the nest. Some hens take to breaking and eating the eggs. Frequently a good hen will spoil her eggs if she is tormented by vermin, rats, cats or people. Hunger or disease will also cause a hen to neglect her eggs. A good hen, if properly cared for, should raise 7 chickens out of 9 eggs if the eggs are sound. In many cases, the eggs are spoiled by the nest not being made properly, or the hen and eggs not receiving proper attention before setting.

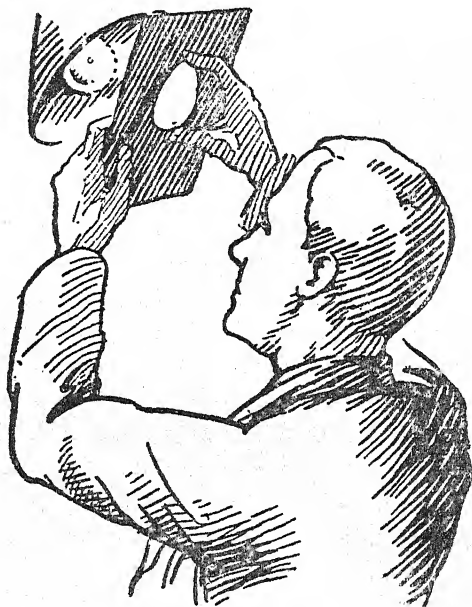
How to treat the eggs—After the eggs have been placed under the hen, all that needs to be done is to inspect them every day to see that they are all right.

Sometimes an egg gets broken in the nest. When this happens, remove the remaining eggs and wash and dry them carefully, change the earth and ashes of the nest. If there is any of the broken egg sticking about the hen, wash it away as well. Unless this is done, the remaining eggs will be injured. The water used for washing the eggs and hen must be 102 degrees F., no colder and certainly no hotter. As soon as the eggs and hen have been cleaned and dried, the eggs must be placed under her in a new nest.

Should an egg get chipped or indented, so long as the skin below the shell is not broken, there is hope for it. The flaw should be patched up with gummed paper. A good thing to mend such a flaw is the marginal paper around sheets of postage stamps. Many eggs have been saved in this way and the young ones have been successfully hatched. The gummed paper must be only large enough to cover the flaw, and must be held to the egg with the finger or palm of the

hand until it properly sticks to the shell. If the skin under the shell is pierced and air has gotten into the egg, there is no hope of saving it.

Infertile and addled eggs must be removed from the nest. The following is a simple method of testing the fertility of eggs:—Take a piece of stout cardboard (the cover of an old book will do) and cut a hole in it in the shape of an egg,



METHOD OF TESTING EGGS.

FIG. 33.

only a little smaller. Place one of the eggs sideways against the hole and then hold up to the light. The light must be as strong as possible, but the egg must not be brought closer than six inches to it. If the egg is perfectly transparent, like a new-laid egg, it is infertile. But if a small dark body is seen floating about the centre of the egg, it contains a chicken. The eggs should be thus tested on the fourteenth day after setting. It is difficult to tell if an egg is fertile or not until

the 7th or perhaps the 10th day after setting. An egg that is quite clear after being twenty-one days under the hen is infertile. If the egg has a partly-formed chicken in it, or is rotten, then it is addled. If the chicken is fully formed and is dead in the shell, it is spoiled. If the germ has formed in the egg and not hatched, it was fertile, but has been addled or spoiled by some cause or other for which the eggs may not be to blame. The following is a good method of testing eggs:—On the nineteenth or twentieth day after setting, fill a large bowl with warm water—the *temperature of the water must be exactly 102 degrees, great care being taken that it is not colder or hotter*—place the eggs in the water. After a minute the fertile eggs containing live chickens will wriggle in the water. This is caused by the chickens endeavouring to make their escape from the shells. The infertile and addled eggs will float about, but will not wriggle. Sometimes the chickens will be heard to cry in the eggs when they are placed in the warm water. The eggs must be allowed to remain only one minute in the water and then taken out, properly dried and put back under the hen.

Some persons occasionally sprinkle warm water over the eggs. When the weather is very hot and dry it may be necessary to do this in order to give moisture. In Bengal it is not often necessary to sprinkle the eggs.

On the twentieth or twenty-first day the chickens will begin to appear. Now the hen must be fed, carefully put back on the nest and left alone for twelve or twenty-four hours. Occasionally the hand must be put under her to find and remove the egg-shells. These vacant shells, if not removed, may become attached to the other eggs and prevent the chickens from coming out.

The chickens need no food for the first thirty or thirty-six hours, so they must be left under their mother undisturbed for about twenty-four hours. If after twenty-four hours there are some eggs under the hen still unhatched, these eggs should be placed under another hen, and the chickens, with

their mother, removed to a clean and warm box. Some chickens will be later in hatching than others, so it is a very good plan to set two hens on the day, and, when the chickens are hatching, give the early ones to one hen and the ones hatched later to the other hen.

A day or two before the chickens appear the nest and eggs must be sprinkled with flowers of sulphur and after the chickens and hens have been removed from the nest, they should be gently rubbed over with Keating's insect powder.

Rats often steal eggs and chickens from under the hens and they sometimes kill the hen. The only remedy is to keep the hen with her eggs or chickens in a box with a good strong bottom and half-inch mesh wire-netting top and sides.

Should any of the chickens be unable to get out of the shell, they may be aided, but if they cannot get out themselves, they are generally not worth the trouble to rear. The best way to help the hatching is to place the egg, with the chipped portion out of the water, in a bowl of warm water (102 degrees). Keep the egg in the water for a minute, and then return it to the nest. This will soften the shell and enable the chicken to break it. Breaking the shell is dangerous, for if blood is drawn, death or deformity will be sure to ensue.

Number of eggs under a hen—The size of the hen and the state of the weather must decide the number of eggs to be placed under her. If the hen is large and well-feathered and if the weather is dry and warm, then from nine to twelve large eggs may be placed under her. If the weather is cold, eight to nine should be given. Small hens should have only six eggs in the warm weather and four in the cold weather. If the eggs are small, more may be given. No more eggs should be placed under a hen than she can comfortably cover. It is better to place too few than too many. In the cold weather the chickens need shelter and warmth. If they do not get it, they will die, so a hen should not be given more than six to eight chickens when the weather is cold.

How to keep eggs—The quality of the eggs to be set must be above suspicion. In order to ensure this, every egg should have legibly written upon it, in pencil or ink, the date on which it was laid. The best way to keep eggs is as follows:—Have a large board (as large or as small as necessary) with a number of oblong holes, about an inch and a quarter or an inch and a half, bored in regular rows an inch or an inch and a half apart. Fix this board on a stand of four legs, and place the eggs, the larger ends downward, on the holes. This egg-stand must be kept in a quiet, clean, dry and properly ventilated place, where the eggs will not be exposed to concussion, noise, bad odour or heat. Turn the eggs over once a day.

Some breeders insist that the eggs should be laid on their sides, if wanted for hatching, and turned regularly every day. A good tray can be made as follows:—Take a piece of nice smooth wood, as large as is convenient. Nail a beading all around it to prevent the eggs from falling off, then nail tiny strips of wood in parallel lines across the tray. These should be placed about one and one-fourth inches apart. Legs can be fixed to the tray if desired. The eggs can be kept quite safely in a tray of this description.

How To Treat Eggs Which Have Travelled—Eggs which have been brought by train or otherwise travelled, run the risk of being broken, not only so, but they are very liable to become spoiled. Before being set under the hen, if the eggs are taken out of the box and kept in the stand at rest and free from jar for twenty-four hours, they have a better chance of hatching. They must not be kept standing for more than twenty-four hours. The journey injures the germ, but by being rested it seems to recover from the injuries. Eggs are not injured so much in travelling by train as by post. A great deal depends upon the distance a season of the year the eggs have travelled, and also upon the treatment the eggs receive after reaching their destination. If fifty percent of travelled eggs hatch out, it will be a great

success. A great deal also depends upon the way the eggs are packed.

Putting The Hen Off The Clock—To put a feather in the nose of the hen and duck her in cold water is cruel and as ineffectual as injurious. The best method is to place the hen in a coop with a barred front and barred bottom and place it in a corner of the shed raised a foot from the ground. Keep the bird in this coop and give her plenty of grain and water. This will effectually break the cluck in a few days.

It is not always wise to refuse to allow a hen to sit. She needs the rest and it will be well to allow her to remain on the nest for a week or ten days, even if there are no eggs to place under her. If a hen is not allowed to rest but is forced to lay, her eggs will prove infertile.

How To Pack Eggs—Eggs for hatching should always be packed in proper egg-boxes when it is desired to send them any distance. These boxes are of cardboard and are divided into small compartments, each compartment being intended to take only one egg.

Wrap each egg in soft paper so that it fits firmly into its compartment. Then there is no fear of the egg bumping about and cracking unless the box is allowed to fall.

Close the box carefully and tie it. Then pack it into a basket with plenty of straw around it. Close the basket and sew the lid on firmly.

If to be sent by rail or post, the basket should be sewn up in hessian and properly sealed. Many dozens of eggs are stolen annually before they reach the purchaser's hands and it is only fair for the seller to do his best to ensure the safe delivery of eggs that leave his yard.

It is wiser to have a handle on the basket as there is less likelihood of it being thrown about instead of being carefully lifted. A rope handle is quite good and does not increase the freight of the package, as the ordinary basket handle would.

If boxes are used instead of baskets, they should never be nailed down. Screws should be used instead and the box

sewn up in hessian to guard against it being opened en route. It should also have a rope handle or a handle made of strong string.

Purchasers should not be too quick in writing sharply about the non-success of a setting, for often the blame may be traced to their own door, and if not, one severe fall at a station or one heavy jarring will ruin the whole success of a setting. We sometimes hear of failures among the eggs of our honest and most upright vendors, whose other eggs sent out have done well. The cause can only be attributed to some such accident as mentioned above. That a handle easy to lay hold of is of great value to every egg package we are quite sure, and would recommend purchasers to insist upon having it. We would also add that much acrimony would be avoided between purchaser and seller if the latter placed a notice on each package sent out, to the effect that eggs before being put in an incubator or under a hen should be rested for twenty-four hours.

Purchasing Eggs.—When it is necessary to purchase eggs for setting, they should be obtained from persons of good repute who are experienced breeders and not novices. Some persons, thinking they are economical, get the cheapest eggs that are to be had, and when the chickens hatch out and grow up are surprised to find them good for nothing. Getting cheap eggs for setting is altogether false economy. A few annas more for each egg would often result in each chicken being worth a few rupees more.

The great majority of people know little or nothing about poultry. They have no good poultry book and read no poultry paper. Their ignorance leads them into many mistakes. Then, again, some people think that whatever they have is the best, and whatever other people may have is not worth keeping. Such people are not to be relied on, their judgment is not to be trusted.

If a person gets a name for supplying first-class eggs and fowls, he will prosper, while if he does not keep his word, if

he indulges in "tricks of the trade" selling stale or infertile eggs for fresh and good ones, old fowls for young ones, diseased birds for healthy ones, or cross-breds for pure bred, people will quickly get to know his ways and will leave him for some one who is honest. "Honesty is the best policy," even in poultry-breeding.

It frequently happens that the person who buys eggs or fowls is very ignorant about the quality of the breed and the treatment of the eggs, and his ignorance leads him to misjudge the seller. If the eggs are not treated properly, they certainly will be spoiled and the seller cannot be accused of selling unsound eggs. Sellers are often abused for what has been entirely the fault of the buyer. One man keeps his eggs standing for three days after he receives them before he put them under a hen. Another man takes the eggs out of the box and immediately sets them under a hen. A third puts the eggs under a hen and covers her over with a small basket and allows her out once in three days. Another trusts his servants to such an extent that they feel safe in changing the eggs under the hen and substituting common ones. When the results prove unsatisfactory, these people feel that they have been defrauded by the persons who supplied the eggs.

Some people do not know what a bird should be like. They want to know why a Light Brahma has black on her hackle and tail, or a Dark Brahma white on his neck and back, or why a Cochin has a tail, or why a Langshan has such few feathers on its legs, and a lot of such absurdities' and conclude by saying that they have been duped in the birds they have purchased. Such people should spend six months on a poultry farm or else invest in a few firstclass poultry books and papers, and devote a few months in studying them before they attempt to breed fowls. It is well for people to remember that every bird of a pure breed is not a perfect bird fit for exhibition. First-class exhibition birds are very rare and expensive. The reason is that it needs special breeding and rearing to produce certain qualities, and not

more than one in 50 or 100 chickens of the purest breed will possess all those qualities required by the standard of first-class exhibition in England, America and Australia. Frequently first-class show birds have been sold for from £50 to £150 each. The time may come when in India we can get grand exhibition birds for 20 to 30 rupees each, but for the present we must be satisfied if we can get really good pure-bred birds for breeding stock for that amount.

To Buy Eggs or Birds—If a person wishes to get good reliable stock economically, and if time is no object, he should visit some reliable poultry breeder, or else write to him and arrange to purchase six lots of eggs from him, twelve eggs in each lot, and set these eggs under good country hens and raise the chickens. He should get eggs of only one breed. The best way to do is to get half of the eggs between October and December, and half between February and March. Even if half the eggs hatch and half the chickens are reared successfully, this will give him eighteen fowls for the money he would have had to pay for two or three birds if he had bought them. If a person has the money and is willing to use it, he should purchase a cock and three hens of the breed he wants, and proceed to raise the chickens. Before the eggs or fowls are purchased, the fowl-house, the run, coops, etc., should be made and kept ready to receive them when they arrive. It is not wise to purchase the fowls first and make their houses and runs afterwards.

Eggs For Setting—There is every reason to believe that the next season will be a repetition of former ones in the matter of occasional unsatisfactory results obtained from eggs purchased for hatching purposes. The very nature of the business makes this a foregone conclusion, and as the number of person becoming interested in poultry for the first time runs into the thousands, it is perhaps timely and appropriate to mention some of the conditions affecting the business, which, while thoroughly understood by older breeders, will be in the nature of instructions to the army of purchasers

above referred to. Buying eggs is something of a lottery. We often see the statement that, "Like will produce like," meaning, as generally interpreted, that high scoring birds will produce their equal. This is only partially true and amateurs should not be misled by it. Any breeder who has ever mated a pen of birds knows that a majority of the progeny will not be the equal of the parent stock, and this is true even when line breeding is intelligently practised. This precludes the possibility of getting all prize-winners from a setting of eggs. The blood lines in the various families or fowls are more or less antagonistic and the mating of high grade specimens will often bring out the latent characteristics in the progeny and defects will be developed which do not show in either of the parents. These conditions are probably responsible for more dissatisfaction than any others. They are the agencies which influence the hatch as far as the quality of the progeny is concerned. In regard to the number of chicks produced, there are obligations to be fulfilled upon the part of both buyer and seller which both parties to the transaction should duly consider. The seller should keep his breeding birds in the best condition. In the first place, they should be of just such quality as he represents. They should be entirely free from disease. They should be vigorous and hardy and of strong vitality and not exhausted and worn out from too prolonged service in the breeding pens, or bad management. They should not be over-fat and the chances of fertility thereby lessened. They should be kept as free from lice as eternal vigilance can make them. Crowded quarters and too close confinement should be avoided. Animal and green food should be provided if the birds are not on good range. In many cases, the male birds need to be fed separately. Care should be taken to see that the matings are congenial to the individual specimens. Eggs should be kept in a reasonably even temperature. Care should be used in packing for transit both in regard to the manner of packing and

The buyer likewise has a few obligations to fulfil before he can justly criticise the seller. He must remember that, according to the established rule of trade, he assumes all responsibility for the welfare of the eggs after the shipper has delivered them to the Railway Company in good condition. If the package is exposed to bad weather by the Railway Company at some railroad station, or the germ is started by the eggs remaining a couple of days in an overheated wagon, or if some messenger drops the package on the floor or platform and jars the eggs enough to injure them, these are not the faults of the sellers, but are some of the chances the buyer takes. Then, there are several things after the receipt of the eggs for which the buyer is responsible. It should be remembered that some hens, even though they sit steadily, are not able to generate enough heat to properly incubate a setting of eggs. This may be a natural condition, or it may be the cause of the ill health of the birds. Too many eggs should not be placed under a hen. Twelve eggs are too many. The hen should be free from lice so that she will not be compelled to leave the nest or stand up in it for relief. It is possible for her to sit too steadily and ruin the hatch. She may leave the nest too long at a time when you do not see her. She may get off at dusk and not find her way back until daybreak, and you cannot say absolutely that she stuck to the nest unless you saw her every hour out of each twenty-four. Much may depend upon the make-up and location of the nest, especially under certain conditions of the weather. After the chicks are hatched, they must receive proper care and feed, or they will never develop into prize-winners even though they have the foundation for these characteristics. If you have had an unsatisfactory hatch, do not write the seller a nasty letter, but consider whether or not you might be at fault.

Purchasing Fowls—Now, for the buyer of birds, for he has also a duty to perform. First, he should write for first-class stock if that is what he wants. He should not write for something nearly as good, or for culls, or for birds "for only

breeding-stock", unless he expects just such fowls to be sent him. No man ever got prize-birds by pretending that he only desired something else. Frankness and truth are essential. When eggs are bought, the buyer must be prepared for incubating them. He should then not be in a hurry, after the chicks are hatched, to raise objections. Wait a while for results. The chicks will show their quality when they are six months old.

Then there is Nature as a factor. No man can "guarantee" eggs to hatch. An egg is one of the "unknowable" things, and both the seller and buyer should understand that fact. Even two setting of eggs from the same flock may not give the same results with different hens as sitters. If buyers will consider this matter, they will be better satisfied in their dealings. Always remember Nature's laws and do not overlook the position of the poultry-breeder, who must sustain, his reputation, yet has no control over the germ of the eggs, the vigour of the embryo chick, the conditions of incubation, or the natural laws of reproduction. He can only send the buyer the eggs from hens kept under good conditions, but he cannot tread within the dominion of Nature.

Careless expressmen, improper handling and various obstacles for which the buyer and seller are not responsible, are also causes of disagreement, for eggs are fragile things and no man in any business has so many drawbacks against him as the breeder of poultry. Considering that the breeder sells "future life", he is more honourable than may be supposed, for he has the buyer, Nature, the railroad company, and sitting-hens all combined as factors in the transaction. When he reads his correspondence, he is not always happy.

Fortunately, these things are better understood than formerly, and the "kickers" are not as numerous now as they have been in the past.

Day-old Chickens—Some breeders sell day-old chickens. As soon as they are hatched, the chickens are put in specially made boxes and sent distances of 500 or more miles. As

they need no food for thirty-six hours, the long fast and the journey do them no harm. Before procuring the chicks, you should have a good hen or a box-foster-mother ready to receive them.

HINTS ON HATCHING

1. Set the hen at night in a well ventilated semidark place apart from the other fowls.

2. Do not place more than 7 or 8 eggs under a country hen.

3. Many people prefer to use a nest box without a bottom. You may make the nest on the ground, scoop out the earth to saucer shape, and line the hollow thus formed with cut straw and tobacco stems or leaves. In such cases, beware of rats, etc.

4. Before setting, examine the hen for insects and if found, dust with a good insect powder. A hen covered with vermin sits badly, and in due course, the chicks also become infested and do not thrive, the result often being fatal. A pinch of sodium flouride among her feathers will destroy lice.

5. Make certain that the hen comes off the nest daily to feed, and that she is provided with maize, fresh water, and a dry dust bath. She may remain off the nest from 10 to 20 minute according to the season of the year. Cooling the eggs daily is most important.

6. Leave the hen alone at hatching time.

Purchasing Fowls—After you have purchased a fowl or fowls, and they arrive at your yard, don't take them out and judge immediately whether or not they are satisfactory or suitable. Remove them from the coop and place them in a quiet place by themselves. They have been cooped up and roughly handled for some days and are tired, hungry, excited and shaken up. Let them get rested, refreshed and groomed a bit before you judge them. Fowls are somewhat human. Ride from Bombay to Calcutta yourself in a drawing-room car, if you please, and the first thing you want is a good

cleaning up, something to eat, and a rest before you go out to attend to your business. You want to make a good impression, don't you? Then, why not give the fowls a chance? This may not seem of very great importance to some, yet it "cuts lots of ice" as the Yankees say, and you know 'tis the little things that count. People improve sometimes when you are better acquainted with them, and the same thing applies to fowls.

CHAPTER X

REARING CHICKENS



A very great deal depends upon the way chickens are treated during their growing stage, for such treatment very largely controls their size and stamina. A large percentage of chickens die from sheer neglect or mismanagement. Chickens of all breeds cannot be treated alike or kept in the same coop. Chittagongs should be kept separate from chickens of other breeds. If kept with other chickens, both the Chittagongs and the others will suffer. The Chittagong, the Game, the Rock, the Orpington, the Wyandotte and the Silkie should be kept each separate from the others. The Brahma and Cochin may be reared together, but even they do better when kept separate. The Chittagong, Game and Silkie must not be kept confined, they need large runs, plenty of exercise and extra animal food. They must also be carefully protected from damp, wet and the hot sun. The Rhode Island Red, Rock, Orpington and Wyandotte do not need as much liberty as the Chittagong, but they must have a great deal of liberty and need to be carefully protected from damp, wet and the hot sun, and also need greater care in feeding. The Silkie does best when allowed to run at liberty with its mother and fed on rice and wheat. The Brahma and Cochin can be kept more confined as they are heavily feathered and are not so active, but even they should not be confined too closely. They need more nourishing food and to be fed oftener, but little at a time. After they are a week or ten days old, they need more liberty. The reason why each breed of chickens needs to be kept separate is because some breeds grow faster and develop quicker than others, and some are more active and quarrelsome than others, and each breed needs different treatment. If all are kept together,

the backward and less active ones will suffer, and the forward and active birds will be injured.

The First Feed.—For thirty-six hours after hatching, chickens require no food, for they absorb the yolk, but it is not advisable to leave them longer than that without food. Thirty hours after the chickens are hatched, they should be taken out of the old nest, and with the mother, placed in a clean box, or put on the clean floor under a basket in a warm, dry and quiet corner. The mother must be fed apart from the chickens, a liberal supply of good whole grain wheat must be given to her and a supply of drinking water. After the mother has been fed, she must be put with her chickens on the floor under the *tappa*, or in the box. A good food, for the first three days, is stale bread-crumbs moistened with milk, and oatmeal and broken wheat given alternately. The oatmeal should be given very sparingly. Morton's oatmeal is the best for this purpose. This should be scattered on the board upon which the chickens are placed. The hen will call out the chickens from under her and they will soon begin to pick up the food. A very small quantity only should be given at a time. The food must be given little and often—every two hours. Care must be taken that the board or ground upon which the food is given is quite clean. A handful of coarse sand or finely sifted grit must be scattered on the board on which the chickens are fed.

How Often to Feed Them.—Chickens must be fed six times a day until they are six weeks old. After that, and until they are six months old, they must be fed four times a day. The first feed every day must be given a little after sunrise. The last meal must be given at sunset. Only as much as the chickens will eat up at once should be given at a time. Nothing should be allowed to remain on the feeding board.

What to Feed Chickens on.—For the first three days give bread and milk, oatmeal and broken wheat in very small quantities every two hours. After the third day, the morning meal should consist of equal parts of finely ground oatmeal,

barley=meal, pea=meal and coarse wheat=flour, sufficiently moistened with milk so that it will not stick to the fingers when pressed and will easily crumble, or a little stale bread moistened with skimmed or fresh milk. The other meals during the day should consist of Morton's coarse ground oatmeal and broken wheat given dry. A very little cooked rice may be given once a day, mixed with wheat=bran and *atta*, especially during hot weather.

During the hot weather give very little oatmeal, and more wheat. At first, the wheat should be broken very small, but as the chickens grow larger the grains should be larger until at three months of age, they receive whole wheat. A very small quantity of "Poultry Powder" given in the soft food to chickens will prove very beneficial.

If preferred the mash can be given dry instead of being mixed with milk or water. It should be placed in small dishes and the chickens allowed to peck at it as they wish. A small feed of broken grain should be fed to them night and morning. The grain can be mixed to ensure the chickens getting a little of each kind every day.

Twice a week or oftener, a little finely=chopped onions and garlic should be given. After the sixth week some finely chopped half=cooked meat and raw onions mixed with wheat=bran can be given every other day. White=ants and earth=worms are very good for chickens, they eat them greedily and should be given them every day. When a good supply of white=ants is given, the meat is not necessary. Chickens fed on white=ants thrive well and grow rapidly. Some fine sharp shell grit, charcoal and pounded old mortar must be given to the chickens every day along with the grain on the feeding Board. Sharp grit is indispensable.

Oil=cake is very good for growing chickens. After they are three months old, they should be allowed some mustard seed oil=cake or lin=seed oil=cake with their food once a day. Some chickens will eat it by itself if mixed with water and left in a plate. But the best way to give it is to pound the cake up

into powder and mix it with water, allow to stand for two or three hours and then mix it with the bran. Give only a small quantity.

Chickens must be allowed green food from the second day of their life; without it they will not thrive. Young tender mustard, cress or lettuce or tender *doob* grass is the best for young chickens. Chopped lucerne is also very good.

Water—The chicks should always have water before them. The water must be perfectly clean and given in a shallow vessel. The following plan is a good one:—

Fill a cup with water, put a saucer over it turned upside down, and turn the cup and saucer over. The cup will now stand topside down in the saucer, and there will be a rim of water all around in the saucer. This will give an ample supply to the little creatures without the danger of their drowning themselves or polluting the water with their dirty little feet. The cup must be without a handle. Any similar contrivance will do. The two things necessary to guard against are the chickens drowning or wetting themselves, and their polluting the water.

A few drops of Condry's Fluid or a small quantity of Permanganate of Potash should be added to the drinking water every day. This will prevent a great deal of sickness and trouble. The quantity of Permanganate of Potash should be only sufficient to colour the water a light pink. A few drops of Parish's Chemical Food should occasionally be added to the drinking water.

The mixture recommended for white diarrhoea may be used in place of any of these with advantage. It is to be understood there is no harm in any of them but a great deal of good. Still poultry-keepers must be guided by their own experience in these matters.

Many poultry-keepers in the United States are adding Terramycin Poultry Formula in the drinking water of chicks daily for the first two weeks. Terramycin fights disease *inside* the chicks. Antigerm 77 degrees sanitizes the drinking

water. Terramycin Poultry Formula does the work of two products, antibiotic plus germicide. It stimulates thrifty gains while it fights disease. The product is a *Pfizer* one and put out by Chas. Pfizer & Co., Brooklyn 6, N. Y., U. S. A. Probably it is not available in India, but one could send for it.

Green Food—Chickens need green food from the second day after they are hatched. They are very fond of tender green *doob* grass and they need nothing better. From July to November they will find all the grass they need, but during the cold weather and dry hot weather, grass will be scarce and some green food must be provided. Nothing can be better than lettuce leaves and young onions chopped very fine. Onions should be given in very small quantities and only two or three times a week, but lettuce can be given every day with benefit. Mustard and cress is also very good for chickens.

Animal food—Animal food in some form is absolutely necessary for chickens. White-ants are unquestionably the best thing that can be given to them. In the absence of white-ants, boiled meat must be provided. The entrails of the goat or sheep are the best meat to be given. The tripe should be properly cleaned and boiled and minced finely before it is given. A small quantity of freshly ground turmeric should be mixed into the meat before it is given. Turmeric given in small quantities is a preventative against disease. Milk and curds are splendid food for chickens. White-ants and milk can be given every day from the first day and meat should be given when they are a month or six weeks old and then not oftener than every other day. During the rains, the chickens if allowed their freedom, will pick up all the animal food they need. But during the hot weather and cold weather when animal food is not very abundant in the fields and gardens, some must be provided.

A splendid form of animal food is found in fish-meal. It can be mixed with the dry mash, or wet mash, as the case

may be. When supplied with fish-meal chickens do not need any other kind of meat. Only a very small quantity should be given at the start and this should be gradually increased as the birds grow older.

Grit—Chickens must be provided with some coarse sand, fine gravel and finely broken and sifted flint. A small quantity may be placed on the feeding board, or else a large quantity placed in an open box in the run. It must never be mixed with the food.

Mixture of food—The following make a splendid mixture of soft food for chickens from about two months of age:—

Whole wheat-meal	...	...	2 pounds
Finely ground barley	...	...	1 "
Finely ground gram or peas	...	...	2 "
Wheat-bran	...	...	3 "
Linseed-meal	...	...	1 "
Precipitated Phosphate of Lime	...	...	$\frac{1}{2}$ "

Add a tablespoonful of Poultry-Powder. All should be properly mixed together. Moisten it with butter-milk or skimmed milk. Make into a crumbly state and give only a little at a time twice a day. The principal grains for chickens should be coarsely ground oatmeal and coarsely ground wheat. *Doob* grass and lettuce are the best green foods. Give the grain dry and on clean ground.

Colour of Chickens—Don't condemn your chickens. Many inexperienced breeders, not knowing that the chickens of some varieties are not true to feather when first hatched, e. g., Black Minorca chicks when hatched have a lot of white and Rhode Island Reds are often a very light buff with some white, jump to the conclusion that they have been swindled and make a great ado about nothing. One must live and learn.

Neglect—Many amateur poultry-raisers neglect their chickens when they get to be eight or twelve weeks old for

the younger broods. This no doubt is because it is thought such chickens can look out for themselves better than the smaller ones. And so they can, to a certain extent, but neglect at this period of their lives often results fatally. The reason that care should not be remitted, at this time especially, is because the down or nest feathers which heretofore have enveloped the body are being shed and full-grown feathers are taking their place, thus causing a constant drain upon the system. It might rightly be called the "first moult" and of course one can readily understand there is not the strength to meet this in the young chicken that there is in the adult fowl. Therefore, let there be no relaxation in care and attention while our feathered pets are donning their new clothes. Animals shed their coats. Dame Nature has provided for the renewal of the covering of birds, fishes, insects, and reptiles also, and in this "getting on of new coats" fowls are included. The old feathers gradually fall off and the new ones take their place with an added lustre and silkiness of texture that is pleasant to the eye of the onlooker and comforting to our pets themselves.

Clipping wings—The wings of growing chicks require an occasional clipping. The wings grow so rapidly in such breeds as the Leghorn, Minorca, Chittagong and some others, that all the life and vitality of the chick are exhausted thereby, and many die from this cause. Many a chicken's life has been saved by clipping its wing feathers, even after it has begun to droop.

Examine the vent—Chickens are often troubled with white diarrhoea. The passage at the vent becomes stopped up. The chicks suffer much pain and begin piping, and if not attended to immediately, will die in great agony. Examine the vent, remove the excrement from around the vent, bathe the part with warm water and Permanganate of Potash, dry with a soft cloth and apply some vaseline or salad oil. Keep the bird separate for a day or two in a dry place. Put a few drops of olive oil down the throat and feed on bread and milk.

If the chicken is very bad, the best thing is to have it destroyed, as even if it recovers it will not be fit to breed from.

If the following solution is given in the drinking water from the time of hatching until the chickens are four weeks old, and then given twice a week for the next few weeks, there will be very few losses from white diarrhoea.

Zinc sulphocarbolate	...	...	15 grains
Sodium sulphocarbolate	...	...	7½ "
Calcium sulphocarbolate	...	...	7½ "
Mercury bi-chloride	...	...	6 "
Citric acid	...	...	3 "

The above is to be dissolved in one gallon of water and the mixture used as drinking water, without dilution.

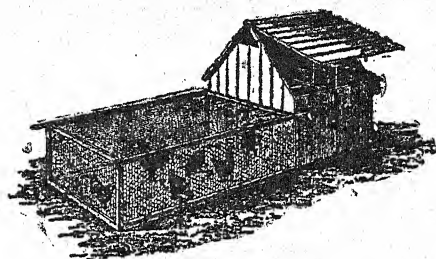
Overfeeding—One of the greatest dangers of chickenhood is overfeeding. If adult fowls are kept in confinement and overfed, they will become overfat and cease to lay or they will be troubled with diseased liver and fatty degeneration of the heart. When young chickens, before they are old enough to digest the food, are given a large quantity of food at one time, they will not be able to assimilate it and will get their stomachs and livers deranged. A very large number of chickens are killed by injudicious and excessive feeding. The proper method is to feed every two hours or so and give only small quantities that can be eaten up at once. Then, again, very young chickens must be given only such food as they can digest. After chickens are three months old there is less danger of overfeeding. Between three and eight months is the period when they grow rapidly and fledge out fully, and they can assimilate larger quantities of food. At this time, they need extra food of good bone and muscle-making substances. If the method of feeding mentioned in the previous section is followed, there will be no danger of overfeeding or underfeeding.

Brooder And Run—Make a box three feet square with wood bottom, top and sides. A door made of a wooden frame and wire-netting must be fixed in front. There must be proper ventilation but no draughts. The run should be six feet long and three feet wide, and 21 inches high. Make a wood frame, nail wire-netting on the three sides and top. Place some thin canvas or cloth over the netting so as to keep the wind out during the cold and windy weather. Put a mat or gunny on the top of the run during the day to protect from the sun. Such a box and run will do well for a hen and 12 chicks, or for 18 chickens alone for the first month.

The Run—For the first three days, the chickens must be kept with the mother under a small *tappa* or in a box during the day. If the day is bright and the ground dry, the *tappa* should be placed on short grass in the compound. But if the ground is wet or the weather damp, they must be put in a box with sand or dry earth in the bottom and kept under a shed. For the first three days chickens need to be kept in close confinements, because if they are allowed to run about, much of their strength will be overtaxed. On the fourth day they need a little freedom, and must be placed under a *tappa* or run three feet in diameter. On the fifth day they must be removed to a proper run. A run six feet long, three feet wide and twenty-one inches high will be sufficient for a dozen chickens until they are a month old. The covered box or coop must be attached to the run to protect the chickens from the rain and the heat of the midday sun. Such a run will save a world of trouble and anxiety and prevent the brood wandering and getting tired before they are old enough to bear the strain. After the chickens are a month old they should be let out with their mother for two hours in the morning and evening. When they are six weeks or two months old, they must be allowed out the greater part of the day. The run must be shifted every day and placed on fresh grass. The chickens must be protected from the heat of the sun, as a large number die from sunstroke. During the hot weather

the runs and coop must be placed under the shade of trees or covered over with thick mats or gunny.

If chickens are kept in close confinements, they will droop and die. When kept confined long, they begin to pipe, and



BROODER AND RUN.

FIG. 34.

this will prove injurious to their health. They must be kept contented and happy, and they are most contented and happy when they run about and scratch for themselves. When chickens are six to eight weeks old, they should be allowed perfect liberty with their mothers. Only during the hottest part of the day and during wet weather should they be kept closed up in their coop and run. It is best to keep the chickens in their coop or in their run during the morning; when the grass is wet with heavy dew, but the earlier they are let out, the better.

Shade—Chickens should be carefully protected from the sun and hot winds. A large number of valuable chickens die from the effects of the heat. The run must be placed in the shade in a cool place and there should be plenty of large shrubs and small trees on the ground under which the chickens can run about and take shelter and scratch during the day.

Crows And Kites—The greatest enemies chickens have in

India are crows, kites and hawks. One cannot too carefully guard against them. Chickens must always be kept under a covered run, and when let out, be watched by some person to protect them from these birds and cats.

At night—The chickens with their mother must be properly cooped at night so as to be safe from cats, rats and thieves, and kept away from draughts and wet. The coop must be large enough and sufficiently ventilated to be comfortable. Damp, dirt, overcrowding and want of proper ventilation are fruitful causes of disease.

A couple of inches of dry earth or sand must be placed in the coop on the wooden floor.

Kept Separate—The hen with her brood must be kept away from the other fowls, or else she will be constantly fighting, and injure or destroy the chickens. Two hens with chickens must not be kept in the same run or very close to each other, for they will fight and peck each other's chickens to death.

Chickens of different sizes must not be kept together. The larger ones will ill-treat the younger ones and injure them permanently. Nor should chickens be kept with adult birds. When chickens of the same size, age and breed are kept together in small numbers in a good run and large pen, they thrive very well.

Injurious Practices—Some people remove the little horny scale which appears on every chicken's beak. They have an idea that this will enable them to pick better. This practice is as stupid as it is useless, and often proves positively injurious to the little birds. Another foolish and hurtful practice is putting food or pepper-corns down their throats, and dipping their bills in water to make them drink.

The best thing to do is to *leave them along*, and let them pick up their own food.

Ground—Experience has proved that it is almost impossible to rear chickens on ground that has been contaminated by full-grown fowls or continuous broods of chickens.

Chickens will never thrive on ground upon which ducks, geese or turkeys have been kept. New ground or ground properly dug up and turned over is the best for chicken-rearing. The chickens' runs must be large, clean, shady and with a lot of good *doob* grass growing on it. Once a year, at least, the ground should be dug up and the earth properly turned and a large quantity of sharp flint grit, slaked shell lime and old mortar scattered over the ground. If possible, a crop of mustard should be raised on the ground every cold weather.

Cleanliness—Absolute cleanliness is very essential, even more so than for grown-up fowls. If the boxes, coops, grounds and runs are allowed to become tainted with their excrements and stale food, it will be impossible to successfully rear them. The sand or earth in the coop must be continually changed, and the run moved every day to a fresh place.

HOUSE AND RUN FOR
CHICKENS.
RUN.

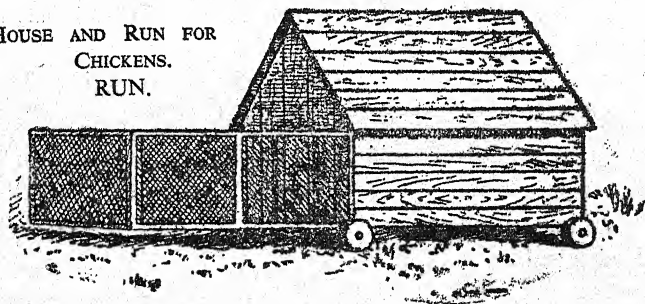


FIG. 35.

Chickencoop with wire run, which may be left out at night without fear of jackals or cats. There should be a lid to the coop to get at the hen and chickens and for cleaning the coop, which should have a bottom and a piece of gunny thrown over the wire-netting during bad weather and at night. The above is a most useful construction, and is a protection not only against animals but kites and crows. Though a little expensive it will repay itself well.

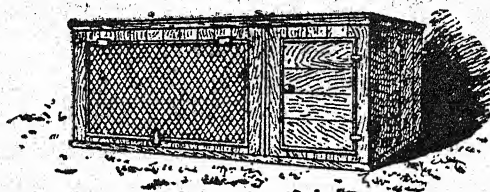
Vermin—Chickens will not thrive if they are covered with vermin. The best way to keep them free from insects is to rub some Keating's insect powder on their heads, bodies

and under their wings, and to occasionally wash their boxes with a strong solution of Phenyle and water, and dry in the sun. If the coop, house and run are not kept perfectly clean, it will be impossible to keep the chickens free from vermin. Paint the boxes and all the woodwork with seven parts of kerosene oil and one part of coal-tar, Stockholm-tar is better, properly mixed together.

Wet And Damp—If young birds are kept in wet or damp spots, they cannot thrive. They should never be allowed out during unsettled weather.

Perch—Chickens under six months of age should never be allowed to roost on perches. Doing so will make their breast-bones crooked and will disfigure them for life. Chickens should be bedded on a thick layer of sand or dry loose earth. The sand and earth should be sprinkled over with flowers of sulphur and with kerosene oil or a strong solution of Phenyle.

Coops And House—It is best to keep only ten or twelve chickens in each coop at night. A coop for twelve chickens between three and six months old should be six feet long, three feet wide and two feet deep. The top, sides and front should be covered with half-an-inch mesh wire-netting, the bottom should be boarded, and the front should have a door



COOP WITH COVERED RUN ATTACHED
FOR CHICKENS.

FIG. 36.

for the chickens to get in and out. The coop should be kept in an open godown or sheltered shed. Only chickens of the same age and size should be kept together. After the chickens are six months old, they should be allowed to roost in a fowl-house.

The coops should be kept very clean and kerosene oil and tar constantly applied to all the wood work.

Weeding Out The Stock—A most important factor in successful poultry-keeping is to avoid over-crowding. In those yards where chickens are reared chiefly for the table, they are disposed of as soon as they are fit to eat, and the weeding out process is carried on all through the season. The tendency, in fact, under these conditions is rather to diminish the stock too much. It is forgotten that some of the January—March pullets ought to be retained as the principal birds to be looked to for eggs in the winter. In many yards, where a good many chickens were to be seen in January and February, there are in October and November only a few late hatched young ones, the older chickens all having been killed or sold, a clear case of killing the birds that would have laid the golden eggs. With those people, however, whose space is limited and who keep pure-bred fowls, sometimes with a view of exhibiting there is a disinclination to reduce the stock for fear that some of the birds disposed of may ultimately turn out well.

Still, the health of the poultry is bound to suffer, as well as the profit side of the account, if the stock is not reduced to reasonable dimensions. Some chickens when two months old will show very marked defects, others will not develop their true qualities until they are four or six months old. Whenever it is seen that a chicken is very defective and unfit to use in the breeding pen, it should immediately be sold for table purposes or killed for dinner. The hens that are three years old should be gotten rid of before they begin to moult. It is better to take a rupee or two for each, which is generally the most that can be obtained for old hens, than to feed them for months, when they are not paying. Of course, if a bird is especially good from a fancy point of view, she should be kept on longer, though for laying a large number of eggs, a hen will have seen her best days by the time she is three years old. Neither is it advisable, except under special

circumstances, to keep the cock birds after they are four years old. They often remain a long time in the moult when they are of that age, and are of little use until February and March.

In arranging to reserve certain birds and to weed out others, the composition of the flock for the ensuing breeding season must be taken into consideration. It is a mistake to keep young birds only. If both the parents are only a year old, the chickens from such an alliance fledge more slowly, mature less quickly and seldom grow as large as those that are bred from three or two-year old hens, mated with a cockerel, or from a three or two-year old cock running with fine, early hatched twelve months old pullets.

Some extra birds must be kept to be put in place of those that leave the breeding pens.

HINTS ON REARING

1. Do not feed the chicks for thirty-six hours after hatching. Allow them to absorb the yolk.
2. If available give them sour skim milk or butter-milk to drink from the first.
3. First feed with rolled oats or stale bread crumbs with hard boiled eggs boiled for thirty minutes, in the proportion of six parts of the former to one part of the latter. Mix in shell and all. Feed six times daily in small amounts about one ounce per day to 12 chicks.
4. After three days, begin feeding with a good chick feed. A mixture of crushed wheat, maize (makka) equal parts with a little cracked rice is good. (See also Standard Chick Ration)
5. Gradually increase the amount of chick feed continuing it until the chicks are old enough to eat whole or coarsely cracked grains.
6. After six weeks, feed a bulky moist mash consisting of boiled vegetables, dried off with a good poultry meal. Feed with mash twice daily and chick feed three times. (See

Standard Poultry Meal for Chicks). After six months old, feed three times daily, once on grain, green food at noon, and once on moist mash.

REARING CHICKENS

STANDARD CHICK RATION

(to be fed dry scattered in litter)

Used for Small Chicks at Slater Poultry Farm.

- 40 lbs. finely cracked wheat (*gehun*)
- 40 lbs. finely cracked maize (*makka*).
- 10 lbs. cracked rice (unpolished rice preferable).
- 5 lbs. bajra (bullrush millet).
- 2½ lbs. cracked charcoal.
- 2½ lbs. cracked granulated bone.

100 lbs.

STANDARD POULTRY MEAL FOR CHICKS, AND GROWING STOCK

(to be fed in a moist mash after chicks are six weeks old)

- 50 lbs. Wheat Bran (heavy bran only)
- 20 lbs. Wheat Ata (*gehun ka ata*)
- 20 lbs. Bejhar ka ata (barley and peas)
- 5 lbs. Maize ata (*makka ka ata*)
- 4 lbs. Bone meal (fine)
- 1 lb. Salt

100 lbs.

After six months old, feed three times daily—once on grain, green food at noon, and once on moist mash.

CHAPTER XI

ARTIFICIAL HATCHING AND REARING BY HAND

Hatching—Artificial incubation is no longer a mere theory. In these days it has reached a state of perfection that is almost astonishing. In these machines, a large number of eggs can be hatched at any time and season of the year and almost as successfully as by hens.

Incubators have to be used where one wants to hatch out hundreds of chickens. In cases where only a few chickens are required, say 50 or so, natural methods of hatching and rearing are better.

In hatching by incubators, it is of the utmost importance that the eggs be fresh, they should not be more than three days old in the hot weather and seven days old in the cold season. If stale eggs are placed in the incubator, the probabilities are they will not hatch. Another thing to be guarded against, is the proper regulation of the heat in the incubator. The heat should be 103 degrees, less will be ineffectual, and more will be injurious. It is needless for me to say much here about the method of working incubators. Different machines are differently constructed and a book with all required directions about regulating and working the machine is given with each incubator. There are, however, a few hints that should be carefully borne in mind. First, care should be taken about proper and sufficient ventilation. The drawers should be opened twice a day and the eggs exposed the full length of time, that is, at the beginning of incubation, for ten minutes, and after the tenth day for twenty minutes or until the eggs are cool. Second, do not allow the light to smoke. Third, never allow the heat to rise above 103 degrees, keep as close to 103 degrees as possible. During May, June, July, August and September the heat will frequently rise very high. This is specially the

case during the week or so before the chickens are due to hatch. Fourth, the machine, the egg-drawer and water tray must be kept scrupulously clean. After every hatch the egg-drawer, water tray and canvas must be properly washed with boiling water and Permanganate of Potash. Fifth, do not open the egg-drawer during the time the chickens are breaking through the shells. They will become chilled. Test the thermometer supplied with the incubator with a good clinical one at the start of each year's operations. Place the clinical thermometer and the one under test in water at 103 degrees F. and note if they record the same temperature. The capsules should also be tested each season by placing them in water at a temperature of 103 degrees F. Capsules which fail to expand at a temperature of 103 degrees F, should not be used.

One of the best machines of the kind is that known as Hearson's Champion Incubator, made by Chas. Hearson & Co. Ltd., 235, Regent Street, London, W. Another splendid incubator is the Glevum. Other good machines are Tamblins (English) and Buckeye (American). The Silver Hen is also good. If the incubator has a glass front to the egg compartment, the eggs in it can be watched during the hatching time. This makes it very interesting.

Rearing—It is, doubtless, very provoking to have a setting of eggs spoiled, but it is even more annoying when the chickens have been hatched and are strong and lively, to find some of them crushed to death by their clumsy mothers, and others dying for want of proper care from their mothers. Hence many attempts have been made to solve the problem of rearing by artificial means. Foster-mothers and Cold-brooders are the best contrivances to take the place of the mother hen, and with proper care and cleanliness, they can be worked successfully in India. When chickens are hatched in an incubator they must be removed from the machines as soon as they are dry. Some of the incubators have drying-boxes for chickens just hatched. When the chickens are

hatched, they must be taken from the egg drawer and put into the drying-box and kept there for twelve to sixteen hours, when they must be removed to the foster-mother. Care must be taken that the drying-box and foster-mother are not too warm, and that there is sufficient ventilation. The heat must not be more than 90 degrees. If the foster-mother is allowed to become too close and warm, the chickens will become ill and die. Only 12 chickens should be kept in India in machines made to hold 50 in England.

There is a simpler and cheaper method of rearing chickens by hand, which is better adapted to India, especially when the chickens are hatched from November to April. After the chickens are hatched, they must be allowed to remain with a hen for three or four days. The animal heat from the hen is very necessary for the chickens. If an incubator is used, the chickens should be kept in the drying-box for the first three days. The lid of the drying-box must be kept an inch or so open, in order to give plenty of ventilation. The chickens should be taken out of the drying-box and fed, after feeding them, they should be again placed in the drying-box. They should be fed every two hours and only a little given at a time. They must be fed as directed in the previous chapter. On the evening of the third day after they are hatched, the chickens will be strong enough to run about, and will be able to eat properly. They should now be taken from the hen or drying-box and placed in the box foster-mother. See paragraph Box Foster-Mother.

The next morning the chickens must be taken out of the box foster-mother and placed on a clean plank under a small *tappa* or run, or in a large open box. Some food should be thrown from a little above their heads down on the plank. At first those taken from the hen may not eat, and will keep crying for their mother, but repeat throwing the food and a few of the chickens will begin to pick up and eat the little pieces, and gradually the others will do the same. As soon as the little creatures stop picking and running about they

must be put back into their box and kept quiet for two hours, when they must be taken out and fed again, after which they must be again put back. They will enjoy the warmth and go to sleep. This process must be repeated every two hours until the chickens are a week old. On dry sunny days they must be left out in the open on the dry green grass under a small run for two or three hours in the morning and evening. It is a good thing to put the chickens out on the dry green grass for an hour or half-hour from the second or third day they are hatched.

Chickens should never be placed out on a wet, stormy or windy day. If the sun is too hot for the chickens, a piece of canvas or mat should be thrown over half of the *tappa* or run. When the weather is unsettled, the chickens should be placed in a large box with the top open, in a warm corner in the shed. Some clean sand or dry earth should be put in the box.

For the first three days a *tappa* or run two or three feet in diameter will be sufficient for a dozen chickens to run in. On the fourth day they will need a little more room. After they are seven days old they must be placed in a proper run out on the green grass in the sun for three hours in the morning and three hours in the evening. A run, six feet long and three broad and two feet high, will be large enough for a dozen chickens. When six weeks old, they can be allowed perfect liberty in the open, but must have some person to watch them and guard them from crows and kites. Until they are eight weeks old chickens should be confined under a small run or in a box for two or three hours during the middle of the day, this rest will do them much good.

Box foster-mother.—For the first three days the chickens should be allowed to sleep under their mothers or in the drying-box of the incubator. Great care must be taken to allow sufficient ventilation in the drying-box. On the third night they should be put in a box made as follows: Make a box two feet long, eighteen inches wide and eighteen inches

high. Cover the top with half-inch mesh wire-netting, put a door on one side of the box made of a wood frame and half-inch mesh wire-netting. To the wire-netting on the top of the box attach strips of flannel, the strips being two inches wide and hanging down to one inch of the bottom of the box. Place these strips 2 inches apart. On the bottom of the box place one inch of clean coarse sand, and over this some soft dry cut straw or coarse sawdust half-inch deep. When the chickens are placed in this box, they will go in between the flannel strips and nestle there as they would under the hen's wings. When a night is cold, throw a piece of cloth over the door and half of the top of the box. This box makes a capital foster-mother. It will be sufficiently large for two dozen chickens of a week old. As the chickens grow larger, fewer of them must be kept together, not more than six chickens, six weeks old must be kept in a box of this size. The wire-netting on the top and the door at the side will give ample ventilation and flannel will give all the warmth required.

When chickens are hatched under hens, they must be properly rubbed over with Keating's insect powder when they are twenty-four hours old, and again when they are removed from under their mother and before they are placed in the box foster-mother mentioned above. If lice are allowed to remain on chickens, they will not thrive. The box and the flannel must be washed with Phenyle or Jayes' fluid and water, and dried in the sun at least once a month, and the chickens occasionally rubbed with insect powder.

After the chickens are eight weeks old, they should be kept in a large box-house on clean dry hay or sand. In calculating space for chickens above eight weeks old and under four months old, you must count two chickens as equal to one full-grown fowl.

The chief difficulty in rearing chickens by hand is keeping them contented and happy. It is not difficult to feed them and give them warmth, but it needs a great deal of time and

care to keep them from becoming restless and from piping. For the first week chickens brought up by hand give more trouble than those reared by a hen, but they soon get very tame and are easily managed. Only chickens of the same age and breed must be kept together.

If there are only a few chickens, and the hens are good mothers, it will not be wise to take them away from them. A hen can manage from 6 to 8 chickens very well in the cold weather and from 8 to 16 in the hot weather.

Overcrowding must be guarded against. If too many chickens are put in a box, or if the box is too close and warm, the chickens will become ill and die of roup or small-pox. Then, again, chills must be strictly guarded against. If the box is not sufficiently warm, the chickens will get chilled. The temperature in the box should be 90 degrees for the first few days and 80 degrees later on.

Incubation—Turning eggs in the incubator.

Turning is most important. Maximum hatchability results when the eggs are turned at three-hour intervals throughout the day and night for eighteen days. A minimum of two turnings a day is necessary for good results. Eggs must *not be turned* after the eighteenth day. At this time, the chick is getting its beak in the right position to crack the shell.

Brooding—Brooding period runs from a day old to 6-10 weeks. Artificial heat is necessary during most of this period. The four basic types of brooders are coal, oil gas and electric. The best growth is obtained if the chicks are started at 95 degrees, then gradually reduced 15 degrees during the first eighteen days. After that the temperature is dropped 1 degree each day until 65 degrees is reached.

Outside and around the hover an absorbent litter is necessary. Crushed maize cobs, bhusi, shavings and peanut hulls are all good. From 3 to 6 inches are recommended to aid in sanitation and disease control. The chick feed should be scattered in the litter to induce the chick to exercise.

The chicks should be kept confined until they can be taken

to clean range ground. There they must be provided with a shelter to afford shade.

Brooding Essentials—A brooding program generally called "clean chick program" embodying the essentials of sanitation is a valuable aid in the solution of disease problems. To grow chicks that are healthy, thrifty and free from disease and to increase profits through reduced mortality, the following practices are recommended:— 1. Clean chicks. 2. Clean brooder house and brooder. 3. Clean ground. 4. Clean litter. 5. Clean feed and water. 6. Clean management.

Commercial farms should use large incubators. Some are already in use in India, but she has a long way to go.

Some of the commercial hatcheries in the United States hold over 10,00,000 eggs at one setting in a mammoth incubator run by electricity, and an enormous trade is done in supplying the farmers with day-old chicks. They seldom hatch their own, but purchase them.

CHAPTER XII

MANAGEMENT OF LARGER CHICKENS, CAPONISING, MANURE, AND FATTENING FOWLS

Larger Chickens—Inexperienced persons are very apt to make a great mistake in rearing chickens, by neglecting those between a month and six months old for the younger brood. They think the birds are old enough to look after themselves and do not require the same amount of care as the younger ones. Whereas the fact is, that the birds need more care when they are between a month and six months old than they ever did or will, and any neglect at this period will be attended with serious results. At this time the down or nest feathers are being shed, and full-grown feathers take their place. This causes a continual drain upon the system, and the birds need greater warmth and extra nourishment, and require to be carefully guarded against exposure to cold and wet.

Chickens under six months old must be fed four times a day and allowed at each meal as much as they will eat. Generous feeding will produce good birds.

Wheat, barley-meal, oat-meal, oil-cake, paddy, gram, peas, green grass and some animal food are the best articles of food for young and growing fowls. White-ants should be given regularly.

Particular attention must be given to cleanliness of their boxes, house and run or yard. Dirty soil and filthy houses will soon kill the birds.

Instructions have already been given about the space needed for larger chickens, and also about giving them a bed of dry sand to sleep on.

It is very necessary to keep the cockerels and pullets in separate houses and yards. When the cockerels are three or four months old, they must be removed from among the hens

and pullets and kept by themselves until they are 10 months or one year old.

Care should be taken to keep only cockerels of the same breed and age together. If birds of different sizes are kept in one pen, the older birds will ill-treat the younger ones and do them a great deal of damage. If cockerels under six months of age are put together at the same time in a pen and run, they will grow up together and live in peace. Game and Chittagong cockerels are more active and quarrelsome than cockerels of the other breeds, and must be kept separate or else they will ruin the other birds. They must not be crowded. Give them as much room in the house and run as you should give adult birds.

Cockerels are ready for the table when they are between four and six months old. It is advisable at this period to weed out all the defective birds—such as are very much mismarked, and all such as have their tails, backs, legs, toes, wings and necks crooked, and all undersized and weakly ones. All these should be either killed or sold for the table. After this, select the best birds and keep them separate for replenishing the breeding-stock. When the worst and the best have been separated, keep the rest by themselves for another two or four months, when you can go over them again and make your final selections, keeping those you want and selling the rest. Those selected for breeding must be treated with great care, and when twelve months old, they must be mated with selected hens.

The pullets will be ready for the table when they are five or six months old, and should be weeded out in the same way as the cockerels. The inferior birds should be either sold or used for the table and those intended for the breeding pens must be kept in separate pens and properly treated. When they are between ten and twelve months of age, mate them with cocks that are at least a year older. The instructions given in the chapter on breeding must be faithfully adhered to.

Caponising—Caponising is the taking away from cockerels the power of reproduction. By this means the weight of the birds and the tenderness of the flesh are greatly increased. The operation should be performed in the cold weather and when the bird is between four and six months old.

The following description is a translation of a French treatise :

"The instrument employed in the operation should be very sharp; a surgeon's small operating-knife, termed a curve-pointed bistoury, is far better than an ordinary knife as it makes a much neater wound and so increases greatly the chances of healing; or a curvepointed penknife may be used. A stout needle and waxed thread are also requisites; a small curved surgical needle will be found much more convenient in use than a common straight one.

"It is necessary that there should be two persons to perform the operation. The assistant places the bird on its right side on the knees of the person who is about to operate and who is seated in a chair of such a height as to make his thighs horizontal. The back of the bird is turned towards the operator, and the right leg and thigh held firmly along the body, the left being drawn back towards the tail, thus exposing the left flank, where the incision has to be made. After removing the feathers, the skin is raised up, just behind the last rib, with the point of the needle, so as to avoid wounding the intestines, and an incision along the edge of the last rib is made into the cavity of the body, sufficiently large to admit of the introduction of the finger. If any portion of the bowels escape from the wound, it must be carefully returned. The forefinger is then introduced into the cavity, and directed behind the intestines towards the back, somewhat to the left side of the middle line of the body.

"If the proper position is gained (which is somewhat difficult to an inexperienced operator, especially if the cock is of full size), the finger comes into contact with the left testicle, which in a young bird of four months is rather larger than a

full-sized horse-bean. It is movable, and apt to slip under the finger, although adhering to the spine. When felt, it is to be gently pulled away from its attachments with the finger and removed through the wound, an operation which requires considerable practice and facility to perform properly as the testicle sometimes slips from under the finger before it is gotten out, and, gliding amongst the intestines, cannot be found again readily. It may, however, remain in the body of the animal without much inconvenience although it is better removed, as its presence is apt to excite inflammation.

"After removing the left testicle, the finger is again introduced, and the right one sought for and removed in a similar manner. It is readily discovered, as its situation is alongside of the former, a little to the right side of the body. Afterwards the lips of the wound are brought together and kept in contact with two or three stitches with waxed thread. No attempt should be made to sew up the wound with a continuous seam, but each stitch should be perfectly separate and tied distinctly from the others.

"In making the stitches great care should be taken. The skin should be raised up so as to avoid wounding the intestines with the needle, or including even the slightest portion of them in the thread—an accident that would almost inevitably be followed by the death of the bird.

"After the operation the bird had better be placed under a coop in a quiet situation, and supplied with drink and soft food, such as soft bread. After a few hours it is best to give him his liberty, if he can be turned out in some quiet place removed from the poultry-yard, as, if attacked by the other cocks, the healing of the wound would be endangered.

"After the operation, the bird should not be permitted to roost on a perch, as the exertion of leaping up would unquestionably injure the wound. It should, therefore, at night be turned into a room where it is obliged to rest on the floor previously covered with some clean sand. For three or four days after the operation, the bird should be fed on soft food,

after that time it may be set at liberty for a short period until it has recovered entirely from the operation, when it should be put up to fatten."

The natives of India are adept at caponising. Any man who knows how to do it will perform the operation for a few pice.

Manure—Fowl and duck manure is valuable for flower and fruit gardens or any crop. It is too strong in its undiluted state, and must be thoroughly mixed with some fine dry earth before it is put on the ground. The manure should be collected in a pit or barrel, and kept at some distance from the house.

Fattening fowls—Capons and young hens fatten the fastest. Growing chickens and old birds should not be put into the fattening-coop.

Only perfectly healthy and robust fowls should be selected. The birds selected must be kept each in a separate coop or compartment. These coops or compartments must be only fifteen to eighteen inches square and two feet deep=no larger. The top, sides and back of the coop must be boarded up, the front enclosed with wire-netting or with bars. The fowls in the different coops or compartments must not see each other. The coops should be kept in a room that can be closed and made dark after the birds have been fed. If kept in the open, a canvas screen should be drawn before the doors. The bottom of the coop should be barred, and have a drawer underneath to receive the droppings. The droppings must be removed twice a day. The coops should be constantly painted over with kerosene oil or Phenyle to keep them free from vermin.

The best food for fattening fowls is Indian corn=meal, barley=meal and boiled rice and, occasionally, wheat=bran or the inner husk of the rice mixed with boiled potatoes, vegetables and butter=milk. The meal and brans should be boiled until quite stiff and dry and allowed to cool. The food should be changed occasionally. The fowls must be fed four times

a day, and as much given at a time as they will eat. A constant supply of water is necessary.

A properly fed large fowl should gain 1 to 2 lbs. a week and should be ready for the table in two or three weeks. Fowls fatten quicker in the warm weather than in the cold. Sometimes a fowl refuses to put on fat, and becomes ill when subjected to the fattening process. When it is observed that a fowl has not gained weight during the first week, it is best to kill it as it is.



CHAPTER XIII

THE INFLUENCE OF CLIMATE ON DOMESTIC FOWLS

Allusion has been made to some of the practical difficulties met with in breeding fowls recently introduced from other countries. Experience and study have taught us that the question of acclimatization is one of the most important to poultry-breeders, although so often ignored. The following article from "Farm Poultry" is well worth studying :—

"The subject, as a whole, considered as it affects both human beings and domestic animals and plants, is but little understood. While it is quite universally recognized that changed conditions, especially changed climatic conditions, often have a decided influence for better or for worse on both plants and animals, the nature and extent of such influences have not been studied enough to make possible the formation of any general laws of acclimatization. Scientific men are confident that investigation and time will demonstrate the existence of such general laws; but at this date, the mass of facts regarding the effects of climate and of change of climate on organic life though considerable and most interesting, has furnished them only with hypotheses.

"It is a recognized fact among farmers and breeders that cattle and horses taken from one part of the country to the other require some time (the average perhaps being about a year) to become so habituated to the new conditions as to bear them easily, and that the systems of some animals never become reconciled to the change.

"Breeders and purchasers of the larger domestic animals, when buying stock, take this fact into consideration to a much greater extent than do breeders of poultry. So also do writers in the stock and agricultural journals. The subject of

acclimatization is mentioned and discussed by them much more frequently than by poultry writers. It has been made familiar in connection with other stock.

"Coming now to the practical application of the question as directly affecting poultry and poultry-breeders, I believe that if the importance of this question were more generally recognized, and the nature and extent of the hindrances. Nature places in the way of transportation of fowls were better understood, there would be ninety per cent less friction in the business than there is today.

"Buyers and sellers of eggs and fowls ought to know that the change of conditions caused by transporting them even a short distance may mean the inauguration of constitutional changes, the exact nature and extent of which can only be conjectured, and which cannot by any known rule or method be controlled.

"We are not even able to select the individuals most likely to accommodate themselves to the change because, so far as observation goes, there is absolutely nothing to guide in such selection. The change which benefits one fowl injures another. Of the two fowls the one which best stands the change may be inferior in constitutional vigour. According to the best information obtainable, the ease with which acclimatization is effected depends not so much on stamina or strength, as on some peculiarity, some constitutional variation or tendency to variability which enables some individuals to conform readily to certain conditions, and to adapt themselves with comparative ease to any changes of conditions.

"The resemblance of two localities in general climatic features does not, it would seem, furnish any assurance that fowls from one are specially suited to the other. According to the best authorities, organisms are affected by the mere fact of change; no two places are exactly alike, though the differences in climate may be imperceptible to us, their operation soon reveals their existence, and then, as we have

seen, the ease with which each individual becomes acclimatized depends less on the extent of the change and the nature of the new environment than on his own constitutional capacity for adapting himself to change—to changes of any kind.

"The recognition of the influence of change of climate furnishes an explanation of many of the disappointments in the quality of stock, even those bought from reputable breeders. It is well known that the tendency to reversion is strong in all thorough-bred stock, but it is not so well known, though just as well ascertained, that a change of location strengthens this tendency. The reversion may be a general deterioration, or may be confined to a few particulars, possibly to only one. It may take the form of deterioration of plumage, or departure from typical shape, or impairment of vigour, or decrease in fertility. It may be general, affecting all the individuals subjected to the change, or special, affecting only a part of them. It may be accomplished so rapidly that it will be difficult to believe that fowls could change so much in so short a time, or so gradually as to escape notice for several generations. It may be permanent and irreparable, or temporary and be gradually eradicated as the stock becomes acclimatized. But that reversion does take place under changed conditions, has been shown so often in the case of other domestic animals that the breeder of fowls who finds his newly bought stock disappointing will do well to consider this point fully before condemning the strain, and accusing the seller of fraud.

"Every buyer of fowls and eggs should keep these facts well before him when making a purchase, and make up his mind that the transaction, like marriage, is "for better or for worse". They may not be perceptibly affected by the change, it may benefit them, it may injure them. The results depend in part on matters beyond human control, and almost outside the realm of human knowledge.

"The time required for acclimatization varies in different individuals, and with the degree of variation necessary to an

approximate acclimatization. Where a change is immediately beneficial, or does not appreciably affect the fowls either way, the element of time hardly needs consideration. But close observation will show, I think, that even after slight changes the first results in breeding are less satisfactory than those obtained later, and that it is always best to have fowls in their new home some time before the breeding season. A few breeders see the importance of this point so clearly that they make a practice of mating their home-bred fowls, as well as others, some months previous to the breeding season.

"At one time I was of the opinion that the period required for acclimatization might be longer or shorter according to



HYDERABAD GAME HEN.

FIG. 37

the season at which the removal took place. Such experiments as I have been able to make fail to confirm this opinion. There are some changes which common sense alone teaches us ought not to be made as, for instance, the removal of fowls from a cool to a hot climate during the hottest season,

or *vice versa*, or the removal of fowls immediately previous to, or during, the moult. Aside from such changes as these, the season of the year seems to have little to do with either the nature of the process or the time required for its consummation."

A number of people in India have imported fowls from Australia and their experience goes to prove that Australian birds do better in India than do the birds imported from England. The journey from Australia to India could be considerably shortened if arrangements were made for the birds to be sent *via* Colombo. If shipped to Colombo and from there by either train or steamer to the Indian port, the voyage would take only from 15 to 20 days instead of from 32 to 40 days as is usual, and the shorter journey will not be so harmful to the poultry.

CHAPTER XIV

DISEASES OF POULTRY ✓

It is comparatively easy to prevent fowls from becoming ill, but once sickness gets in among them, it will be found extremely difficult, if not impossible, to effect a cure.

"Prevention is better than cure" is a motto especially applicable to fowls and their diseases. In most cases, the only thing to be done when serious disease takes hold of a fowl is to kill it and bury it deep under ground or burn to ashes and bury the ashes.

The most common causes of illness among poultry are dirt, damp, overcrowding, bad food and water, badly ventilated or draughty houses, vermin, and, very frequently, contagion. Lack of cleanliness is a prolific cause of disease. Fowls are certain to become ill if they are kept in a badly ventilated house or are overcrowded. Neither can they stand wet—they are unlike ducks. Water will soak right through their feathers and give them a chill.

When fowls have been purchased at an auction, market, or from dealers, or have been bought from a person the condition of whose poultry-yard you know nothing about, or when the birds have travelled, it is always safe to keep them separate from the other birds for at least two weeks. Birds that have travelled long distances in very close coops and hot railway wagons, or are exposed to draughts and wet on the journey, are liable to become over-heated or chilled and take ill. They must be kept separate for at least two weeks and be fed and watered separately, and the vessels used for them never used for the other birds. Frequently a bird brought into the poultry-yard will bring infection with it, and cause terrible havoc among the birds. It may contract some infectious disease while en route in the railway brake van, having been perfectly healthy when despatched.

Ranikhet disease may thus break out. Too great precaution cannot be taken in this matter. When a bird is brought into the yard, it should be closely examined. Examine its mouth and throat for canker and diphtheria, and the nostrils and head for roup, the legs for scurvy, and under the feathers for lice.

The first thing to do when a fowl becomes ill is to remove it from the rest and place it in a small, dry, warm and properly ventilated house by itself. This will give the sick bird a chance to get better, and prevent the disease spreading through the yard. Sick poultry must be kept warm, fed properly and treated gently. The next thing to do is to find out and remove the cause or causes of the disease and give some preventive to the unaffected birds, and thus prevent all the other fowls from becoming sick. The poultry-house and the place where the sick fowl is kept must be frequently disinfected with Carbolic powder or Phenyle powder. You can make Phenyle powder by mixing eight ounces of pure Phenyle with three or four seers of clean sand or sifted ashes.

Let us divide the diseases of poultry into three classes: first, common and simple ailments; second, serious but not infectious diseases; and, third, infectious diseases. Most of the medicines prescribed are homoeopathic, and can be obtained from any homoeopathic dispensary. They are safe and efficacious.

I. COMMON AND SIMPLE AILMENTS

1. *Fledging*—Chickens often droop and suffer much while their feathers are growing, especially in the cold and wet weather, and the breeds which feather most rapidly suffer most. Getting the feathers too early rapidly weakens them and stunts their growth.

Keep them out of the wet and damp, and give them sufficient warmth. Clip the feathers of the wings and tail. Give some meat every other day, and a little chopped onions and

garlic. Put a few drops of Parrish's Chemical Food in their drinking-water, or give a little Douglas' Mixture, put a little Poultry Powder in the morning food, give it only two or three times a week. Dust frequently with Rough on Lice, or some other good insect powder.

2. *Moulting*—Some fowls suffer very much during moulting. If care is not taken, they will be permanently injured if not die.

If kept separate and properly fed and housed, fowls very seldom suffer much during this period. Very fat birds suffer much during this period. Birds in moult should not be allowed to remain in the breeding pen, or cocks and hens to run together.

Protect the bird from damp, cold winds, and from intense heat.

If the bird is becoming thin and looks unwell, give oatmeal or wheat-meal mixed with milk in the morning and a little meat during the day. A small quantity of linseed meal given in the food twice a week will be beneficial. Sunflower seed is also good. Give some Sulphur or the Poultry Powder and Douglas' Mixture twice a week. It will greatly help the older birds if the old feathers in the wings and tail and in the legs are gently pulled out. The birds should be kept free from lice and given plenty of green food, and, if possible, allowed free range or a large run.

3. *Loss of Feathers*—Vermin and want of green food are the chief causes of fowls losing their feathers before moulting. Rub the fowls with Rough on Lice (see Chapter on Recipes), give a liberal supply of green food, provide a dust bath, and remove the bird from among the other fowls, and keep it warm, and well sheltered from damp and cold winds. Give Sulphur or the Poultry Powder in the food.

4. *Soft Eggs*—Some hens lay soft-shelled eggs, that is, eggs with a skin only. This is caused by want of sufficient lime or by overfeeding. It is also sometimes caused from

the bird being driven about and frightened, or from the bird being troubled with vermin.

Remove the causes. Supply lime, reduce food, keep free from vermin, and treat the bird gently.

5. *Scaly Legs*—Sometimes fowls are greatly troubled with this. It is caused by an insect under the scales of the legs. It is infectious. Bathe the legs every morning for three days with a mixture of equal parts of oil and kerosene taking care not to burn the tender skin under the feathers. After three days wash with soap and warm water, and rub on some Zam Buk or Embrocation.

6. *Soft Crop*—The crop is enlarged and soft as if filled with water, when pressed, most offensive water is discharged. This is caused by obstruction of the food passage or by indigestion. Give a small teaspoonful of Epsom Salts, after this give Condyl's Fluid, five drops three times a day in a dram of water, and some Tonic Mixture once a day for a week, supply grit. Add charcoal to the food or give it in pills. Stop soft food for a time and feed only on whole wheat.

7. *Feather-eating*—Some fowls are greatly addicted to eating feathers. If they do not find them lying about, they will pull them off the other fowls. Rub some Asafoetida, kerosene oil or Elliman's Embrocation on the feather of the neck or part of the body from which the feathers are plucked.

It is caused from want of sufficient iron and animal food. Give a little Sulphur and Salt or Poultry Powder in the food, and Douglas' Mixture in the water. Increase amount of meat food. Give $\frac{1}{2}$ oz. raw meat minced per bird, 3 times a week.

Give all food in the scratching litter to keep the fowls busy. Also, add a little linseed to the grain feed.

If the hard horny parts of the beak are pared with a sharp knife, the bird will find it difficult to pull feathers. Feather-eating is sometimes a vice, and nothing will cure the bird of it. The best thing in such a case is to kill the bird.

8. *A Cure for Feather-Pulling*—Feather-pulling is often the result of idleness, and also a lack of meat in the diet. Fowls that are well fed and confined, and which have no inducement to scratch, seem to learn the vice. One hen may happen to pull a feather from another by way of diversion. The sweet taste of the blood is satisfactory, and as the hen finds that it can have an unlimited supply from the other members of the flock, she puts her resolution into practice. Other hens learn from her and soon the entire flock is ruined. If one of these hens is put in with another flock, she teaches them the vice. If one buys such a fowl, there is a liability of bringing the vice into the flock. A feather-pulling flock is almost worthless, because it requires more food to produce more feathers, and the supply of eggs falls off correspondingly.

If the hens are very valuable and contract this vice, they may be cured by patient attention. Unfortunately the vice is usually contracted by valuable hens that are confined in pens.

The way to cure a hen of the habit is to cut off, with a sharp knife, the horny edge of the mandibles or upper and lower part of the beak. By carefully cutting this off, at the same time cutting off the sharp end of the upper beak, there will be a wedge-shaped opening between the two halves of the beak when the mouth is closed. This prevents them from getting a hold on a feather firm enough to enable them to pull it out. Cutting this horny edge off the beak does not hurt any more than cutting one's finger nails, and it will grow out again in a few weeks, by which time the vice is usually forgotten.

9. *Egg-eating*—Some fowls eat eggs, and will devour all they can find in the laying-house or sitting nests.

If there are only one or two culprits it is always best to kill the bird and use it for table, as the whole flock quickly learn this vice. It is difficult to cure once this habit is started.

Want of lime and gravel, or worms and insects in the fields are the chief causes. Supply these and give the bird

her liberty. If this will not cure her, a number of eggs should be emptied of their contents and filled with a paste made of the eggs mixed with strong mustard and Phenyle. The hot mustard and phenyle will teach the bird a lesson, and she may leave the eggs alone. Another plan is to leave a number of China eggs lying about the house and run. The hen soon gets tired of pecking at these and learns to leave them alone. If this will not cure her, she must be killed. Cocks as well as hens are given to eating eggs, and if one fowl does it, others will learn to do it also. Providing dark nests sometimes helps. Prevent eggs becoming broken in the hen house, as a broken egg usually starts the hen. Strengthen the shell by giving the fowls calcium (lime) at all times. Snail shells and oyster shell (broken) will provide lime.

10. *Pale Yolks*—The eggs of some breeds are naturally of a pale colour, but sometimes eggs have an unnatural paleness, which is a proof of weakness. Birds kept in confined runs and insufficiently supplied with green food produce pale yolks.

Give the hen a large run and abundance of green food; also some of the Poultry Powder or Tonic Mixture.

2. SERIOUS BUT NOT INFECTIOUS DISEASES

1. *Apoplexy*—This disease is generally caused by over-feeding, exposure to the heat and close confinement. Brahmas, Orpingtons and Rocks are very subject to apoplexy. They seem to suffer more than the other breeds from the effects of the heat. The attack is sudden and generally fatal. During the hot weather, and in the rains, hens in their nests in the act of laying are frequently attacked. Sometimes excitement will bring it on. Sometimes cocks and hens will get to fighting, and this will cause apoplexy. If the bird is not dead when noticed, it should be immediately bled by cutting the vein nearest the bone under one of its wings, and cold water should be poured from a little height upon its head. If the

fowl recovers partially, give it Belladonna ix, one drop in a teaspoonful of water three times a day for two or three days, and feed it sparingly on soft food for a week.

Sometimes signs of an approaching attack can be observed—the bird having a staggering, unsteady gait, as if intoxicated. In such a case it must at once have its head bathed in cold water, and be removed to a cool quite place. Give it a teaspoonful of Epsom Salts, and after that two drops of Belladonna four times a day. During the hot weather put a tablespoonful of Epsom Salts to a quart of the drinking-water.

2. *Bumble-foot*—Large fowls are especially subject to this ailment. It consists, as its name implies, of a gathering at the bottom of the foot. Paint the part affected with lunar caustic or Tincture of Iodine, or if the foot is very bad, apply linseed poultices to it daily until the gathering is ripe, then lance it with a sharp knife, and take out all the matter. Sometimes a hard core will be found in it. The patient should not be allowed to roost on the perch at night, but should be bedded on straw until the foot is quite healed. The wound should be properly washed with Phenyle and water and the poultice should be continued for a few days after the lancing, a little Vaseline and Iodoform, Zam Buk or Elliman's Embrocation applied to the spot and the foot bound up with a bandage will soon cure it. The bird should be kept in confinement until the wound is healed.

Bumble-foot is often caused by rough stony ground, or by heavy birds jumping from roosts that are too high for them. Correct the cause and the trouble will cease.

3. *Cramps*—Simple cramps are brought on by exposure to wet or keeping the bird in a damp or cold place.

Boil neem leaves in water, add some salt, and rub the legs with it. Elliman's Embrocation is very good. Give warm and nourishing food, and keep the bird in a dry, warm and sunny room on straw. Give internally Rhus Tox. IX and Bry. Alb. IX alternately, one drop twice a day, or else give the Tonic Mixture. Do not give rice, but feed on barley,

wheat and oats. If along with cramps, the fowl is thirsty, has high fever (the normal temperature of a fowl is 107 degrees to 108 degrees), and the droppings are yellow, white or green, suspect tick fever. (See Chapter XIV Ticks and Tick-Fever).

4. *Crop-bound*.—It is no uncommon thing for the crops of fowls to become so full of food or of some other substance that they cannot assimilate it. The consequence is that the fowl is unable to swallow anything, and naturally it pines away. The causes of cropbinding are various. It may be caused by the bird swallowing a piece of leather, paper, bone or matted grass. It manages to get this as far as its crop, but there the thing sticks, and refuses to go any further, blocking up the passage to the stomach, and finally preventing the bird from swallowing anything else.

Again, a fowl will at times gorge itself with a quantity of dry food, until its crop becomes unduly distended. Then the bird goes and has a drink, this causes the food to swell, the crop to become yet more distended and to lose its power of elasticity. In order to cure the bird, its crop must be emptied. To do this, first pour a little warm water down its throat, and gently knead the crop with the hand for a few minutes. Leave the bird for about an hour, and then repeat the operation, this time pouring a little olive oil down its throat. If this does not do any good, take the bird between the knees, with its head downwards, and try to force the food in the crop out into the mouth by gently pressing the crop downwards.

If all these measures fail to have any effect after they have been repeatedly tried, it will be necessary, as a last resort, to cut the crop open and empty it. This should only be done in extreme cases, when everything else has failed.

There should be two persons to perform the operation, the operator and his assistant. Let the assistant take the bird in his lap, and keep it quite still by holding the base of the two wings with one hand, and the legs with the other. The

operator will require a very sharp knife, a small article such as a small scoop or a small mustard spoon with which to empty the crop, a needle and some thread for sewing it up. All the instruments, and also the hands of the operator, must be dipped in diluted Jeyes' Perfect Purifier, Izal or Carbolic lotion. First make a straight cut in the upper part of the crop, about an inch in length, and then make a cut in the inner part and take out all the contents of the crop through it. Wash the crop with Condyl's Fluid and warm water and sew it up again. The thread used for the sewing should be either horse-hair or cat-gut, not any vegetable substance, and the two skins must be sewn separately. Apply Zam Buk or Elliman's Embrocation to the wound. After the operation the bird should be fed very sparingly on soft food only and for the first day it should not have any water. It must not be allowed to have any whole grain for at least a week afterwards. Give some Poultry powder or Tonic Mixture.

5. *Egg-bound*—Hens are sometimes unable to pass their eggs. This is caused by the eggs being too large, the hen being too fat, or inflammation of the egg-producing organs. If not relieved, the bird will die.

The bird will go more than once to the nest, sit there some time, and then rush about to find another place. She will become mopish, and then unable to move. She will die in a day or two, or may linger on for a few days.

Apply some Vaseline up the vent by means of a syringe or feather, and hold the bird over a pot of hot water and let the steam envelop her vent. Give a teaspoonful of Epsom Salts, and a drop of Aconite to the bird and keep on low diet. Some persons can bring away the egg with the hand, but this operation needs very great care, as the bird may be permanently injured. Sometimes the egg will break inside and pass out.

6. *Inflammation of the Brain*—This is an incurable disease, so is also vertigo. Destroy the bird.

7. *Leg weakness*—This complaint is usually found among

young cocks of the larger breeds, and is caused either by wrong feeding, too rapid growth, damp, excessive heat, too much confinement, cold, damp floor or breeding from immature or weakly parents.

Give plenty of animal food and some Phosphate of Lime every day. Give Parrish's Chemical Food in small doses, or some Tonic Mixture. Rub with Elliman's Embrocation, or paint with Tincture of Iodine. Give as much exercise and liberty as possible.

Control consists in prevention rather than treatment. Make sure that the diet of the parent stock, as well as the diet of the chicks, contain about 50 parts of manganese per million parts. To make sure that the diet contains an adequate quantity of manganese, it is suggested that a mixture of 100 lbs. of common salt and 17 lbs. of anhydrous manganous sulphate be used in place of the salt in the feed. One-half per cent of this mixture should be included in all mash diets and 1 per cent in growing and starting mashers with which grain is to be fed.

8. *Paralysis*—This is incurable, it is best to destroy the bird.

9. *Rheumatism*—This disease is very much like cramps, except that it is accompanied with swelling of the joint and great tenderness. The same treatment as for cramps is effective.

10. *Vermin*—This cannot be called a disease but frequently leads to it by causing disquietude and want of rest. In India, fowls are greatly troubled with these pests, much more so than in England, especially during the rains. Lice, bugs, red mites, ticks and fleas may be included in this category. It causes hens to break their eggs and leave their nests, and fowls to desert their roosts at night, during which time they cannot rest. Prevention is better than any cure in this case by keeping the poultry-house and the run clean. Apply some kerosene oil and tar to the inside of the house, coops, nests and perches, lime-wash the outside of the house, but

put some Phenyle in the lime or wide with a mixture of kerosene oil and tar thoroughly. Sprinkle Carbolic Powder or Phenyle Powder on the fowl-house floor, or wipe the floor with kerosene oil.

Lice are a terrible but unavoidable plague, which you must fight against constantly. Chickens just hatched from under the hen are sometimes covered with lice on the head and neck, sprinkle the little creatures with Keating's insect powder, then wait for an hour or two, and rub Keating's insect powder on the affected parts very gently, and after a little while the disgusting parasites will try to make their escape by coming to the surface of the soft fluff of the chick instead of sticking on the skin and tormenting the poor little bird. The lice seem half intoxicated from the effects of the powder and are then easily removed. Still, they do not die and ought to be burnt or dropped into a strong solution of Phenyle or kerosene oil and tar. This should be repeated once a week. "Rough On Lice" is more effectual, but it also affects the chickens, which droop for a while. Though I have never seen any die of the effects of the powder or be any the worse for it after a little time, still I should say Keating's powder was much the safest to use for little chickens. The mother hen must also be properly rubbed over with "Rough On Lice". After rubbing her, keep her separate from the chickens for an hour so as to allow her to shake off the lice and powder that are on her. In the chapter on Recipes will be found some reliable remedies for lice, also how to make "Rough On Lice".

After about a week the process of rubbing heads and necks of chickens must be repeated. When half-fledged, the birds seem to have a period of rest from their enemy, but still they must be looked to, and if any traces of lice are found, apply some "Rough On Lice". There are four different kinds of lice and fleas that trouble fowls. The house bug also is very injurious to fowls. They live in the coops, perches, nests, walls and floors. The only way to get rid of

bugs is to close up all the doors and air passages of the fowl-house and burn plenty of sulphur in it and keep the fumes in the house for six hours. After that, the house, floors, doors, boxes, nests and everything in the house must be thoroughly washed with strong Phenyle and water and then painted with a solution of kerosene oil and tar. This must be repeated frequently. Unless the birds and the house and coops are thoroughly freed from vermin, the birds will die. As mentioned before, chickens, from the incubator have the great advantage of keeping free of lice, at any rate until they have had time to grow strong. Many young broods droop and die off, simply on account of lice, ticks and bugs, nobody suspecting the pretty little chicks to be so tormented and gradually killed by those small but formidable enemies.

For grown-up fowls, use cocoanut oil six parts, oil of Eucalyptus one part and kerosene two parts as a cure for lice, but it ought not to be necessary to use this remedy, except during the rains and, perhaps, when moving a hen from her nest. It must never be used for sitting hens, as the powerful kerosene kills the chicks in the eggs. Great care must be taken to see that the oils are thoroughly mixed before applying otherwise the kerosene oil will greatly injure the birds.

Another very good remedy for lice on fowls is oil of Eucalyptus one ounce, spirit of Camphor one ounce, properly mixed with six ounces of cocoanut oil and applied to every part of the bird where lice remain. Instead of the above, the following may be used with good results:—

Spirit of turpentine..... 3 chittacks.

Camphor..... 1 chittack.

Cocoanut Oil..... 12 chittacks.

Apply only a few drops to each part. At the same time the coops, nests and all the wood and bamboo work must be thoroughly rubbed with kerosene oil seven parts and coal-tar one part, well mixed together. This should be done once a week.

The most effective lice powder known is made as follows:—

Three parts of gasoline (Petrol) and one part of crude carbolic acid, 90-95 per-cent strength, or if the latter is not obtainable, take three parts of gasoline and one part of cresol.

Mix these together and add, gradually, while stirring, enough plaster-of-paris to take up all the moisture. It will take about four quarts of plaster-of-paris, to one quart of the liquid. The exact amount, however, must be determined by the condition of the powder. The liquid and dry plaster must be thoroughly mixed and stirred until the liquid is evenly distributed through the mass of plaster. If correctly mixed the result should be a dry pinkishbrown powder.

Work the powder into the feathers of the infected birds, especially under the body and wings and around the vent. A minute or two later the dead and dying lice can be shaken on to a piece of paper and burnt.

The powder has a slightly numbing effect on the hands of the operator. It is very poisonous and should never be used for animals that lick themselves. One of the best remedies for destroying lice is the use of 40% nicotine sulphate "black leaf" (40) on the perches. Paint on with a brush on the top surface of all the perches half an hour before the birds retire at night. In the morning all the lice will be found dead. Repeat treatment in 10 to 14 days in order to kill off any more lice hatching from eggs.

Ticks are very troublesome in some parts of the country, and are more difficult to get rid of than lice. The ticks get under the feathers of the poor birds and burrow under the skin and soon kill the birds. On close examination you will find the corners and crevices of the coops and houses crowded with the vermin. It is a case of kill or cure. Pick off all the seed ticks you can find on the birds and rub the birds with Cocoanut oil twelve parts, Turpentine one part, Camphor one part, Phenyle one part and Eucalyptus oil one part. Neem oil is also good. Treat the house coops, etc., in the same

way as for bugs. See chapter on "ticks and tick fever", its prevention and cure.

11. *White Comb*—White comb and black rot of the comb are both troublesome diseases and frequently the affected birds die. The disease is caused from bad feeding and want of cleanliness. Give from half to one teaspoonful of Epsom Salts in a little warm water. Wash the affected parts with Phenyle and water.

Make an ointment of the following :—

Camphor.....	1 part.
Phenyle.....	1 part.
Turpentine.....	2 parts
Cocanut oil.....	4 parts
Sulphur.....	4 parts
Boracic Acid Powder.....	4 parts

Rub the affected parts with the ointment.

Zam Buk is also very good.

Give plenty of green food and feed on soft food for a time.

Give Arsenicum Alb. IX, one-drop doses three times a day internally ; or give Tonic Mixture.

12. *Wounds*—Wounds ought never to be neglected. Dress with a solution of Permanganate of potash or Phenyle and water. Apply some ground turmeric or equal parts of ground sulphur and Boracic Acid Powder mixed together. Apply Iodoform to keep off flies ; if flies can get across to the wound, maggots will result. These must be removed. Many can be pulled out with forceps. Bathe the infected wound with a strong disinfectant (in good phenyle). If the wound becomes infected with maggots, it should be treated with commercial benzol in order to destroy the maggots which then may be picked out with forceps. The wound is dressed with applications of pine tar oil to act as a repellant and to promote wound healing.

A broken leg can be set if taken in hand at once and a plaster-of-paris jacket made over the leg with powdered plaster and water, the fowl being held fast until the plaster

becomes hard. If this cannot be done, the broken limb must be put up in splints. The bird must be kept confined in a quiet corner for a few days.

13. *Seep*—This is really consumption and is incurable. The fowl eats but is listless and grows thin. The best thing to do is to kill and bury the bird at once.

14. *Swelling of the oil gland* above the tail—Do not press or cut it. Many people take this oil gland to be a disease. This is not correct. Every fowl has one, and oils and preens its feathers by means of it. Ignorant servants call this "kanta" and burn it. This is both cruel and dangerous to do. Leave it alone. Very occasionally it may become inflamed through getting clogged up, in which case bathe it with hot water in which some boracic has been dissolved.

15. *Diarrhoea*—Simple diarrhoea is caused by bad feeding and dirty water, want of cleanliness, exposure to wet or excessive heat, indigestion. If droppings are green, yellow or white, tick fever is indicated. See chapter on Ticks and Tick Fever.

Give the birds a tablespoonful of olive oil or a teaspoonful of Epsom Salts, and give Ipecac IX, two drops in a teaspoonful of water every two hours, and then give Ars. Alb. IX one drop in a little water every two hours, or a dose of Tonic Mixture twice a day. Keep the bird in a quiet corner and feed on arrow-root mixed into balls with cold water. Three drops of Perry Davis's Pain Killer in a dessertspoonful of water three times a day will do good. Chlorodyne is also good.

16. *Dysentery*—This is brought on from the same causes as diarrhoea.

Give a tablespoonful of olive oil or teaspoonful of Epsom Salts and also Ipecac IX two drops in a little water every two hours for a day, and then give Mercurious Cor. 3x one drop in a little water every two hours. Feed on arrowroot, also give a little *bael* fruit. Keep the fowl quiet and away from the others.

17. *Liver Disease*.—When any valuable fowl is seen to be pale about the face and shrunken about the comb, it should be handled at once to see if there is corresponding wasting away, for this generally denotes tubercular disease of the liver, a complaint that will not only inevitably prove fatal, but is also highly contagious. Occasionally a bird may be found to be going light without the symptoms of liver complaint, and this may be due to pulmonary disease, though there would be a cough to indicate complaint of the lungs. There is no cure for this. Ordinary cases of birds going light after a hard season of laying may be cured with cod-liver oil.

18. *Gapes*.—This disease is chiefly confined to chickens, and is due to the presence of small worms in the windpipe. These obstruct the air passage, so that the bird has continually to open its mouth and gape in the effort to breathe, hence the name of the disease.

There are numerous methods of treating gapes. One common way is to take a feather, strip all the down off of it except a little at the point. Dip this point in turpentine and camphor, place it down the windpipe of the chicken, and after giving it a twist or two round, pull it out. The worms are often thus extracted with the feather. This plan, however, requires care or else the chicken may be choked. In very mild cases it may be sufficient to place a little Camphor or a small quantity of Turpentine or Condyl's Fluid or Permanganate of Potash in the drinking water. Another, and a very effective cure, is to cause the chickens to inhale the fumes of Carbolic acid. When the acid is heated it gives off a quantity of fumes. Hold the head of the bird among the fumes so that it inhales them, taking care at the same time that they are not sufficiently dense to suffocate it. This will very likely require repeating two or three times in order to thoroughly destroy the gape-worms. Or else mix one drop of Turpentine, one drop of Eucalyptus oil and one drop of Tincture of Camphor with six drops of mustard oil and pour

gently down the chicken's throat. I have sometimes put a couple of drops of Spirit of Camphor on a small piece of bread and put it down the bird's throat. Repeat this twice a day for three days. Try three or five drops of Little's Soluble Phenyle in a teaspoonful of water and gently pour it down the bird's throat. It is well to dust the chicken-house and run with fresh lime or strong Phenyle Powder after a case of gapes has appeared there.

The disease is epidemic and is generally caused by fowl water, exposure to wet or by decayed food. The sick birds must be separated from the others.

A piece of camphor, kept continually in the drinking water, acts as a preventive.

3. CONTAGIOUS DISEASES

1. *Chicken-pox*—This is really small-pox in fowls. Chicken-pox is often mistaken for roup. There may be a slight cold in the bird at the beginning, and the bird may appear to be dull and refuse its food. But, generally, the disease shows no premonitory symptoms. Sometimes the bird has chicken-pox and roup at the same time.

It is caused generally by contagion, and is very infectious. Probably the infection is carried by flies, mosquitoes or sparrows as it is difficult to account for the disease spreading as it does.

Servants may also bring the disease from near-by villages, by carrying half-dried scabs on the soles of their feet or shoes.

Symptoms—A pustular eruption appears on the face, under the wings, and in some cases, on the feet of the bird. Its first appearance is much like patches of dried blood on comb, face, or wattles as if the bird had been pecked and the blood had dried. The vesicles are pointed in the centre, and about the second or third day are filled with a watery fluid. Frequently the vesicles enlarge and run into one another. The eyes and mouth become affected, the bird becomes blind and is unable to eat, or the feet become so bad that the bird is

unable to walk. For the first day or two the bird shows very little signs of constitutional disturbance, but the fever and inflammation may gradually increase until the bird becomes very weak and is unable to move and dies in a few days.

In mild cases the pustules dry up and fall off in three or four days, and the fowl is soon quite well again. If properly treated, the bird will recover even though the disease is of a severe form.

Treatment—This disease must never be neglected. The secret of success is to commence treatment immediately the first signs of the disease appear.

Separate the sick bird from the other poultry, keep it in a dry, cool and properly ventilated room free from draughts and a good distance from the other poultry. Give each bird from $\frac{1}{4}$ to 1 teaspoonful of Epsom Salts, to which add one drop of Tincture of Aconite. Feed on soft food, such as boiled rice, bread-crumbs and milk, barley-meal, ground wheat and milk. Give it as much water as it will drink, but put a teaspoonful of cream of tartar in a pint of water and place this in a clean earthen vessel near the fowl, so that she may drink at pleasure. Wipe the face and the legs with a cloth dipped in a strong lotion of Condy's Fluid or Permanganate of Potash and water, and apply some ground turmeric and *neem* leaves to the affected parts. Another good remedy for external application is the juice of the leaf of the *Bhangrya* plant. This plant is known to a great many natives. Some people have rubbed the affected parts with the juice of unripe tomatoes with good results.

Give internally the following Indian medicine which has been found to be very efficacious:—

Root of the *Chircheri* or *Chorchora* plant, four tolahs.

Root and leaves of the *Jokha* or *Joga Bailta* plant, four tolahs.

Thorn of the *Shimul* cotton tree, four tolahs.

The whole to be thoroughly ground and mixed together.

Give of this five grains to each fowl three times a day, or give five drops of spirit of Camphor once a day.

The latest treatment for fowl pox is vaccination. Vaccine can be had from the Indian Veterinary Research Institute, Mukteswar, U. P. and the Biological Products Section, Indian Veterinary Research Institute, Izatnagar, U. P. The Institute will also forward instructions for the use of Fowl-Pox Vaccine. Consult your local veterinarian at once.

The best thing of all is to protect against fowl-pox by vaccinating. Immunity then lasts for about six months.

In the United States, if the birds are vaccinated with fowl-pox vaccine when 8 to 12 weeks old, they are immune for life. Pigeon-pox vaccine is used if the flock is laying as it will not lower egg production. Pigeon-pox vaccine is applied only by the brush method.

Another proven remedy is as follows:—

Paint all the ulcers with citrine ointment daily until they dry down to a black scab. This will probably be in three or four days. Lift off the scabs carefully with a fairly sharp instrument. The little white roots of the disease will be found adhering to them. Collect and burn these. Wash the bird's comb and affected parts with a fairly strong solution of Permanganate of Potash.

At the same time the bird should be dosed with the following:—

Wheat flour.....	1 tablespoonful
Flowers of sulphur.....	1 "
Cayenne pepper.....	20 grains
Fowler's solution of arsenic.....	25 minims
Cream.....	a sufficient quantity

Mix well together and make into 20 pills. Give each affected bird one pill in the morning for four mornings. If the sulphur acts too powerfully on the bowels give boiled milk to drink. During treatment, feed on boiled onions mashed with oatmeal and boiled rice. For chickens the above dose must

be divided according to the size of the chick. Small chickens do not often recover from chicken-pox and are better destroyed.

2. *Cholera*.—Poultry-yards today are plagued with more than one disease that was altogether unknown to our grandfathers, and one of the most dreaded of these is undoubtedly chicken cholera. It makes its appearance in a yard often, no one knows how, and in a few weeks destroys the greater number of the birds.

The usual causes of cholera are lack of stamina in the birds, overcrowding, uncleanness, lack of green food and absence of shelter from the rays of the hot sun. Drinking stale, tepid water and eating decayed vegetable matter are also frequently to blame for its origin. There can be no doubt but that it is highly contagious, and one sick bird will pass the disease on to a whole yard.

When a bird is first attacked, it loses its appetite, looks thoroughly out of condition, its feathers are ruffled, and its eyes sunken and lacking lustre. What food it does take it seems unable to assimilate, but it eagerly consumes a large amount of water. It has diarrhoea, and at first the excrement is green and slimy, but afterwards it becomes whitish and frothy, and sometimes specks of blood are found in it. The bird becomes more and more sleepy and disinclined for exertion, and at last it sinks down and dies. Occasionally convulsions immediately precede death.

The fowl usually dies a few hours after the symptoms appear, though sometimes it lingers for several days.

If fowls are kept on fresh ground, are not overcrowded and are properly cared for, there is not much fear of their being attacked. Should a bird become ill, strict repressive measures must at once be taken. Every fowl in the slightest degree affected must immediately be destroyed and burned or put right away from the others. The water which the healthy birds drink should have a small piece of camphor placed in it. All the excrement must be gathered up, and the house and

run have quicklime or some Phenyle scattered over them. The inside of the house should be cleaned with special care, and the walls and various appliances washed with fresh quicklime and water in which is mixed Carbolic or Sulphuric acid or some Phenyle.

Give a teaspoonful of pure olive oil and five drops of Tincture of Camphor every two hours, or else 5 drops of Perry Davis's Pain Killer in a teaspoonful of water four times a day.

Feed the bird on arrowroot balls mixed with cold water. Only half a teaspoonful at a time must be given every three hours.

Great care must be taken not to spread the complaint by going immediately from the sick fowl to the healthy stock, or by carrying anything from the one to the other. When the bird dies, its body should be buried deep under ground or burned.

Unless the bird is a very valuable one, the best thing to do is to kill it and bury or burn it immediately it is attacked with the disease. A strong solution of Phenyle and water should be used in the house and coop. Put Douglas' Mixture in the drinking water of all the fowls.

Give all the unaffected fowls 3 drops of Perry Davis's Pain Killer in a teaspoonful of water or else 5 drops of Tincture of Camphor in a teaspoonful of olive oil once a day for three days.

The latest information regarding cholera comes from the Indian Veterinary Research Institute, Mukteswar, U. P. They indicate that the best method of combating the disease in flocks of poultry is to employ a double inoculation consisting of a killed bacteriological vaccine and an anti-serum. These products are of particular utility at the time of natural outbreaks, but can also be used as prophylactic agents a few weeks before any period of the year during which outbreaks of the disease are likely to occur. Both products, serum and vaccine, have now been prepared at that Institute and are

available for distribution upon indent. Mukteswar particularly requests that intimation be sent to them when the Fowl Cholera products referred to above fail to have any effect in controlling supposed outbreaks of this disease. In all cases of doubt they request that certain material from the diseased birds be collected and forwarded to them.

The materials required are (1) blood smears from affected or dead fowls, (2) pipettes of heart blood taken with sterile precautions from dead fowls, and (3) samples of blood serum collected from living affected fowls and particularly from fowls which have been affected and have recovered. The best method for the collection of serum from living fowls is to obtain it from the vein which crosses near to a joint under the wing. If this vein is punctured and blood is allowed to run into a naturally formed "cup" below the point of puncture, the blood can then readily be sucked up into a pipette.

Sulfa drugs, particularly sulfaquinoxaline, sulfamethazine, and sulfamerazine may be of value if used early in an outbreak. Use only according to directions. Consult a veterinarian for an accurate diagnosis. Recovered birds are dangerous carriers.

Fowl Typhoid—This often is confused with cholera as the liver is enlarged, also the spleen and kidneys. Birds are usually pale and may linger around with diarrhoea which produces weakness. Control is the same program as for cholera. Stagnant pools in the yard are most likely the cause. Very little value will be received from using the sulpha drugs. Consult your local veterinarian for a diagnosis and follow his recommendation.

3. *Cold*—This complaint is indicated by the same symptoms as we find in human beings, namely, a running at the nostrils and a slight swelling of the eyes. It arises from cold or exposure and, *if not attended to, may develop into roup or consumption*. A person suffering from cold and cough or influenza must not be allowed to go into the fowl's run or house. Fowls take the infection from human beings. For

cure, the bird should be kept in a warm place and have one drop of homoeopathic tincture of Aconite IX and Arsenicum Alb. IX, alternately four times a day—add ten drops of glycerine, or else give one grain Quinine and three drops of Sulp. acid dil. twice a day. Give nutritious food rather stimulating in its nature. The Indians give a teaspoonful of pure mustard oil and a quarter teaspoonful of ground chillies. Inject a little Condy's Fluid through the nostrils. Put a little glycerine and camphor in the drinking water of the fowls that are not affected, a little garlic is also good.

Isolate the bird at once for this disease is highly contagious. Severely affected birds had better be destroyed *at once*. Colds (infectious coryza) are usually caused by faulty housing conditions and intestinal parasitism.

4. *Scurfy Face and Comb*—This disease is caused by fungoid growth of insects and is contagious. Apply the following lotion:—

Eucalyptus oil.....	1 part
Spirits of Camphor.....	1 „
Phenyle.....	1 „
Turpentine.....	2 parts
Cocoanut oil	4 „
Flowers of Sulphur.....	4 „
Boracic Powder.....	4 „

Wash the parts with Phenyle or Izal and water and apply the lotion twice a day. Zam Buk also is very good but is rather expensive. Painting the affected part with Tincture of Iodine will often arrest the disease. Indians apply ground raw turmeric and *neem* leaves with good results.

Give the bird Ars. Alb. IX twice a day, one drop in a little water and feed on simple nourishing food. Give Poultry Powder or Tonic Mixture.

Another remedy that has been proved successful is as follows:—

Wash the bird's comb with warm soapy water and rub in

gently a sufficient quantity of Red Oxide of Mercury Ointment 1 in 8.

Leave for three or four days, then wash off. A little vinegar should be rubbed over the comb after it has been dried.

If very bad, a second application of the ointment may be necessary. Take care that none touches the bird's eyes.

5. *Roup*—Roup is a disease to be dreaded for poultry. It is highly contagious, and at the very first symptom the affected fowl ought to be killed. The writer has tried to cure roup, but his advice is to destroy the bird. By trying to save it, you may lose all your flock. It is far better to start afresh with new stock or a setting of eggs

Symptoms of Roup—It may come on suddenly, or slowly, with previous signs of general debility, moping. etc. The first signs are those of catarrh or cold in the head, dry cough or dull wheezing. There is fever and the fowl drinks eagerly. The comb and wattles may be pale or dark coloured. The cold grows worse. There is a yellowish or bloody discharge, thin and watery at first, which grows thicker and thicker, and fills, in severe cases, throat, nostrils, and eyes. The eyes may be closed and swollen even to the size of a walnut, and the sides of the face may swell up. Pustules form all about the head and in the gullet and discharge a frothy matter. The crop is generally swollen, though not always. The blind fowl cannot see to eat or drink, and hence is said to lose her appetite, although a most ravenous appetite is sometimes displaced. *The discharge has a bad odour and this is one of the chief signs of the presence of the disorder.* Death may result from several causes, from starvation, the fowl not being able to eat, from suffocation, the thick matter clogging up the air passage, or from simple debility, as in so many other disorders.

The list of symptoms will explain the various names which have been applied to it, viz., swelled eyes, diphtheria, sore head, bronchitis, asthma, canker, sore throat, etc., but some

of these conditions may exist even when roup is not present. One of the best means of detecting the approach of roup is to lift the wing of the suspected bird and see if there is not a spot where the feathers are smeared with a discharge from the beak, which has rubbed off when the bird has put its head under its wing at night. Also, invariably look at the nostrils and see if they are clean and free from the slightest clogging. Go the rounds at night with a lantern and inspect your birds. Listen then for rattling or sneezing.

Causes of roup—In all the above, there does not seem to be the trace of any special poison, it is like a typhoid influenza, which when it comes as an epidemic, will destroy a great many human lives. Cases not treated are generally fatal in three days, some fowls may live seven to eight days. Some may live longer. Those causes that can be determined do not need enumeration here. Anything that lowers the tone of the fowl—bad ventilation, filthy houses, etc.,—will most assuredly cause roup. A very prominent cause, however, is exposure to draught and wet. So prominent is this, and so marked is the commencement of the diseases at the beak, that it might almost be called malignant catarrh, and it is possibly nothing more. *Fowls are sometimes destroyed by a cold alone.* Roup is most common in autumn and winter and where fowls are exposed to wet, cold draughts and damp sunless quarters. When fowls are shut up in a crowded, hot and badly ventilated place during the night and let out in the morning into the cold, windy and damp air, they are sure to become ill.

The disease is epidemic and contagious from contact with the discharge, either when a diseased fowl touches another, or when a healthy fowl gets the discharge through the drinking fountain or otherwise. It attacks all ages, preferably the older birds and may run rapidly or slowly. It also kills ducklings and turkey poults, though rarely.

If treated in the very early stage when the eyes are still watery, using one-fourth gram of sulfathiazole to each ounce

of feed, the bird may recover. Later treatment is useless. Relieve crowded conditions, maintain uniform temperature, around 50 degrees F. with proper ventilation. Recovered birds should be segregated.

The pen, run and boxes must be thoroughly washed with Phenyle and water, and when dried rubbed over with tar and kerosene oil. All earthen or wood water vessels and feeding dishes must be destroyed.

6. *Roundworms*—With roundworms the birds appear listless and unthrifty. The worms are often noticed in the droppings when first passed because of writhing wire-like whitish worms about 1-2 inches long.

The clean-ground system is the only practical control system. If infested, a flock can be given a flush of Epsom Salts by using 2 ounces of Epsom Salts per gallon of drinking water for half a day. This is followed by 2 lbs. of ground tobacco (2% nicotine) in each 100 lbs. of feed for 10 to 15 days. Flush again with Epsom Salts at end of treatment. Individual capsules of nicotine sulphate may be used also.

Piperazine, a relatively new wormer for roundworms, is very effective and can be used in drinking water.

7. *Tapeworms*—Chickens with tapeworms have a listless gait, thinness and a lack of thriftiness as symptoms.

The head of the tapeworm is buried in the lining of the intestines and cannot be reached. The clean-ground system is the only practical control. Internal treatments are not very effective. Although some of the worm may slough off, the head still remains to feed upon the birds' vitality.

Kamala in the form of individual treatment is as effective as any known drug.

8. *Pullorum disease or bacillary white diarrhoea*—This kills chicks under 21 days. Chicks are huddled, droopy, have poor appetite. There is no cure or relief known after infection sets in. Testing the parent stock to identify and remove infected birds is the only successful control, as the disease spreads to chicks through the infected egg by the hen.

All breeders therefore should be blood-tested with the Pullorum antigen. This is available from the Biological Division of the Indian Veterinary Research Institute, Izatnagar, U.P. The price for 200 doses or a phial of ten c.c. is Rs. 5/. The blood-testing, however, should be done by a trained veterinarian only.

Seek advice from your Poultry Disease Investigation officer. For further information see Indian Poultry Gazette, April 1959, page 28.

9. *Coccidiosis*—Chickens with this disease have ruffled feathers, are droopy, sleepy, and weak in later stages. They will have bloody droppings or cheesy lumps with some blood in manure. Chicks are light in weight.

To control coccidiosis, many sulphur drugs are valuable in reducing losses or even preventing losses. Two of the better coccidiostats available in India are Sulphaquinoxaline (Embazine) and Sulphamezathine. Of these two drugs Sulphaquinoxaline is less toxic and can be used effectively at a lower dosage than Sulphamezathine. Both drugs can be given in either the feed or water. These Sulpha drugs should be used according to the manufacturer's directions. Consult your local veterinarian for a diagnosis and follow his recommendations.

For further particulars in regard to this disease, see the Indian Poultry Gazette, July 1958, pages 17 and 18, edited and published by Division of Poultry Research, I.V.R.I., Izatnagar, U.P., India.

DISEASE PREVENTION

Lice Control—Chicks can be treated individually. Mercurial ointment is effective only for chicks. It must not be used on breeding stock because the mercury will affect fertility of the birds and eggs. Nicotine sulphate ointment can be used as was recommended for mercurial ointment.

Wet-dipping method—Either Sodium fluosilicate or sodium fluoride may be added to warm water at a rate of 1 ounce per gallon. The birds are held by the wings and plunged into the dip, leaving the head above the solution. The dip is rubbed into the feathers and skin, then the head is immersed for a moment before holding the bird up to drain.

Dusting method for lice—Powdered commercial sodium fluoride is good. It may be applied by the pinch method or by means of a powder shaker. A pinch of powder is placed on each of the following locations : head, neck, back, breast, below the vent, tail, each thigh, and under each wing.

For the powder shaker method, the bird is held while the powder is shaken on and rubbed into the skin from a can having a perforated top. One pound of commercial sodium fluoride will treat about 100 birds by the pinch method. When used in a powder shaker, it may be diluted with three times its bulk of flour, powdered talc, fine dust.

Wounds infected with maggots—wounds infected with maggots should be treated with commercial benzol in order to destroy the maggots, which can then be picked out. The wound should be dressed with applications of pine tar oil to act as a repellant and to promote wound healing.

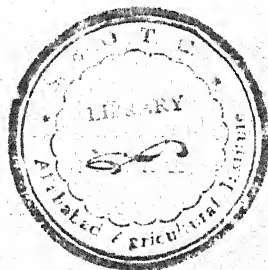
The mortality problem is the chief problem that confronts the poultry-keeper, regardless of his location. Probably more failures occur because of high mortality than for any other reason. The principal reasons for high mortality are diseases and parasites.

Prevention is the only practical method of controlling poultry diseases. Fowl-pox, commonly called chicken-pox (chechak) is an example of a disease for which there is no practical treatment, but which can be easily controlled by vaccination. Protect your chicks. Where it is likely to appear every year with severe consequences, chickens should be vaccinated when 3 to 5 months old. Consult your local veterinarian or poultry disease officer. He will get the vaccine for you and show you how to vaccinate.

Strict sanitation is necessary for prevention and control of poultry diseases. Poultry houses and equipment should be cleaned daily and sprayed frequently.

Spraying is necessary to control parasites. These are ticks, mites and lice. DDT is good. Mix 2 lbs. of DDT with 1 gallon of water. Use a small power spray or a garden-type compressed air-sprayer. Pay particular attention to cracks, crevices and rough spots. Creosote oil, anthracene oils (also known as carbolineums) are also effective against fowl ticks when sprayed into their deep hiding places. The spray *must reach* the tick in order to do any good.

Above all, control Ranikhet disease by having all your fowls vaccinated with the freeze-dried Mukteswar Vaccine. Vaccination in conjunction with sanitary measures is the guiding factor to the problem of control and eradication of Ranikhet Disease and not vaccination alone.



CHAPTER XV

RECIPES

1. *Tonic Poultry Powder*—To be given during the rains and cold weather only, not in the hot weather—

Charcoal	...	...	5 seers
Black Salt	...	...	$\frac{1}{2}$ seer
Linseed	...	...	5 seers
Hemp Seed	...	...	1 seer
Cayenne Pepper	...	...	$\frac{1}{2}$ seer
Turmeric	...	...	2 seers
Camphor	...	...	$\frac{1}{4}$ seer
Chiretta	...	...	$\frac{1}{2}$ seer
Ginger	...	...	1 seer
Sulphate of Iron	...	...	2 chittacks
Sulphur	...	...	1 seer

Each ingredient to be finely ground separately and then all to be thoroughly mixed together.

A quarter of a teaspoonful to be given to each fowl every morning, in small pills or in the food. Give for a week and then stop for a week.

During the hot weather give the following:—

Charcoal	...	...	5 seers
Black Salt	...	...	$\frac{1}{4}$ seer
Camphor	...	...	$\frac{1}{4}$ seer
Chiretta	...	...	$\frac{1}{4}$ seer
Sulphate of Iron	...	...	$\frac{1}{8}$ seer
Sulphur	...	...	$\frac{1}{2}$ seer
Treacle	...	...	3 seers

Grind finely and mix together thoroughly. Give half teaspoonful to a fowl every morning for a week or so and then stop for two weeks or more.

2. *Tonic Mixture*—For weak leg and debility :—

Sulphate of Iron	...	...	16 grains
Strychnine	...	...	$\frac{1}{4}$ grain
Phosphate of Lime	...	...	80 grains
Sulphate of Quinine	...	...	8 grains
Tincture of Gentian	...	...	2 drams

To be made into 32 doses. One to be given every day.

3. *Quinine Mixture*—For simple colds and fever :—

Quinine	...	...	$\frac{1}{2}$ grain
Sulph. Acid (dil.)	...	...	1 drop
Tincture of Steel	...	...	1 drop

To be given once a day in half an ounce of water.

4. *Douglas's Mixture*—

Sulphate of Iron	...	...	$\frac{1}{4}$ pound
Sulph. Acid (dil.)	...	...	$\frac{1}{4}$ ounce
Water	...	...	1 quart

One ounce of this mixture to be given to every half gallon of drinking water.

5. *Rough on Lice*—Have some fresh cowdung made into cakes and dried in the sun. Do not allow any straw or wood to be mixed with the cowdung. When the cakes are properly dried, have them burned. When the ashes are still black, before they become white, have them removed from the fire and kept on one side. No water must be put on the ashes.

When cool, the ashes must be sifted through a fine flour sieve.

Take some fresh strong tobacco leaves. The country tobacco the people call *balati* is the best. Dry in the sun and pound into powder, pass through a fine flour sieve.

Take two seers of the prepared cowdung ashes, add one and a half chittack or 3 ounces of pure Phenyle to it. Mix and rub the whole thoroughly until the Phenyle is properly mixed up with the ashes. To this add one seer of the prepared tobacco, mix properly until the ashes and tobacco are thoroughly mixed together. To this add half a pound of Flowers of Sulphur, mix properly.

When prepared, put into bottles or tins and cork tightly until wanted for use. This powder should be applied to all parts of a fowl affected with lice.

When needed for chickens, only half the quantity of Phenyle and tobacco should be used.

Another way of making insect powder :—Take six pounds of finely sifted coal ashes, one pound of Flowers of Sulphur, four ounces of Petroleum and four ounces of Phenyle. Mix the ashes and Sulphur together, and mix the Petroleum and Phenyle together; then mix the whole together thoroughly. For very small chickens, Keating's Insect Powder should be used.

When applying the powder to the bird, it should be held on a large sheet of paper or a sheet of tin, and as the lice fall on the paper, they should be destroyed by fire.

6. *Lice Lotion*—(1) Napthaline one ounce, Methylated spirit one ounce, Cocoanut oil seven ounces. The following can be applied to large chickens and adult birds. (2) Kerosene oil two ounces, Phenyle one dram, Cocoanut oil seven ounces, put in a bottle and shake up well until properly mixed. Turpentine one ounce, Eucalyptus oil one ounce, Camphor half ounce, Cocoanut oil seven ounces. Apply to the bird with a soft rag.

7. *Mixture for Bugs, Ticks and Lice*—To be applied to all wood and bamboo work. One part of Coal-tar to seven parts of Kerosene oil, well stirred until most of the tar is dissolved. Stockholm tar is preferable to Coal-tar for coops, cages and nests. Apply liberally to all coops, boxes, perches, doors, posts, walls, etc., put into all cracks and crevices in wood or wall.

8. *Phenyle Powder*—Take ten pounds of sifted ashes, add a pound of Little's Soluble Phenyle and mix together thoroughly. Sprinkle the house and shed with this, and put on the floor of the coops. Only the best Phenyle must be used.

9. *Kerosene or Petroleum Powder*—Take two seers of

Kerosene or Petroleum oil, add quarter of a seer of Coal-tar, stir thoroughly. Place 20 seers of clean sand in a tub and pour the prepared Kerosene oil on this and mix properly, sprinkle this on the floor of the house and yard, all the lice will disappear.

10. *Whitewash*—Take two seers of unslaked Lime, put into a large bucket. On this gently pour eight seers of hot water. When slaked, add one pound of crude Carbolic acid and stir thoroughly. Apply to the mud or brick walls while still hot.

11. *Dust-Baths*—Dig a hole 12 inches deep and 3 feet in diameter in a high part of the run or shed, fill with sifted cowdung ashes or coal ashes. Add half a pound of Flowers of Sulphur and half a pound of Napthalene and mix with the ashes. Bury some dry tobacco leaves in the ashes.

12. *Fumigating with sulphur*—Make a bright charcoal fire in a small country *choola* or *ungati*, put this in the room, close up all the doors and windows and make the place airtight. Place a large tin or iron pan on the fire, place a lot of coarsely ground Sulphur on the pan and get out of the room as quickly as possible. Keep the room shut up for six hours.

13. *Condy's fluid*—Put quarter ounce of Permanganate of Potash crystals into a quart of water. Shake the bottle until the crystals dissolve. The solution can be made weaker by adding water.

14. *Sulphur*—Sulphur ground into very fine powder and added to the food during the hot weather is a very good thing for fowls. It must not be given during wet, damp and cold weather.

A teaspoonful of ground Sulphur given in soft food will be sufficient for 16 fowls or 32 chickens.

CHAPTER XVI

THE FOWL TICK AND TICK FEVER

Treatment of tick fever or spirochaetosis—Tick fever is caused by bacilli in the blood, known as *Spirochaetes*, which may readily be seen by examining a drop of infected blood under the microscope. Fortunately there is a specific for this disease, which if used immediately the first symptoms are noticed will in most cases effect a cure. It is Soamin (an arsenical preparation) and which is put up by Burroughs and Welcome in tabloid form and can be secured from any reliable chemist. It is administered by hypodermic injection into the pectoral (breast) muscle, the dose being one-third of a grain dissolved in 1 c.c. of distilled water for each 3 lbs. live weight of the fowl. Injections should be given daily for 1 to 3 days. Provided the owner knows that there are ticks about and that his birds are likely to get tick fever, he can take it for granted, that directly a bird gets listless and drowsy, it has tick fever and he will be wise to give it at once an injection, no matter whether he can find any ticks or not.

Only fowls bitten by ticks which are themselves injected with tick fever, develop tick fever. The bite of healthy ticks, however, though not inducing *Spirochaetosis*, causes intense irritation and serious loss of blood. Young chicks are killed outright, and fowls become weak if not removed from the tick infested building, death frequently resulting from emaciation. Egg production is practically stopped and the fowls reduced in flesh and covered with seed ticks, which are round in shape and of a bluish black colour, and resemble the head of a pin. A careful examination of the fowl will reveal them on the breast, under the wings, and on the thighs, etc.

Ridding fowls of seed ticks—Mustard oil, neem oil or Mercury Ointment, i.e., Blue Ointment, lightly applied will kill the seed ticks on the fowls, but a better and surer plan than this is to place all infested fowls in an old and cheap crate for ten days. Within this time the seed ticks will drop from the fowls, and secrete themselves in the cracks, when the crate should be burnt and the fowls removed to tick-proof quarters, filled with tick-proof perches as outlined below. Infested fowls may be dipped twice at intervals of about 10 days in a warm solution of "Cooper's Sheep Dip" of rather weaker strength than that used for sheep. The immediate effect of immersion is sometimes rather alarming, the birds lying on their sides as if about to die. They quickly recover however and with care fatalities are rare. *The head should not be dipped.*

Treatment of tick infested houses—As has been said, ticks are most resistant and ordinary insecticides are useless. In general, it may be said that the same methods as are commonly advocated for the common red mite are successful in combating the tick. 1. Burn all the old roosts and nests. 2. Brush over the entire house with kerosene or hot coal tar containing a little crude carbolic acid, about 1 ounce to 1 gallon. Anthracene oil however is to be preferred to kerosene or crude petroleum, as it is more destructive and more persistent. Whatever is used, it must penetrate between the smallest crack as the ticks hide deep. After a thorough spraying the new roosts and nests should be painted at a week's interval to keep ticks from developing, as some ticks are sure to escape the spray. A painter's blowlamp also has been very successfully used to burn ticks out of a house. After the house has been entirely freed, or better still burnt, and a new one erected on new land, tick-proof perches must be installed.

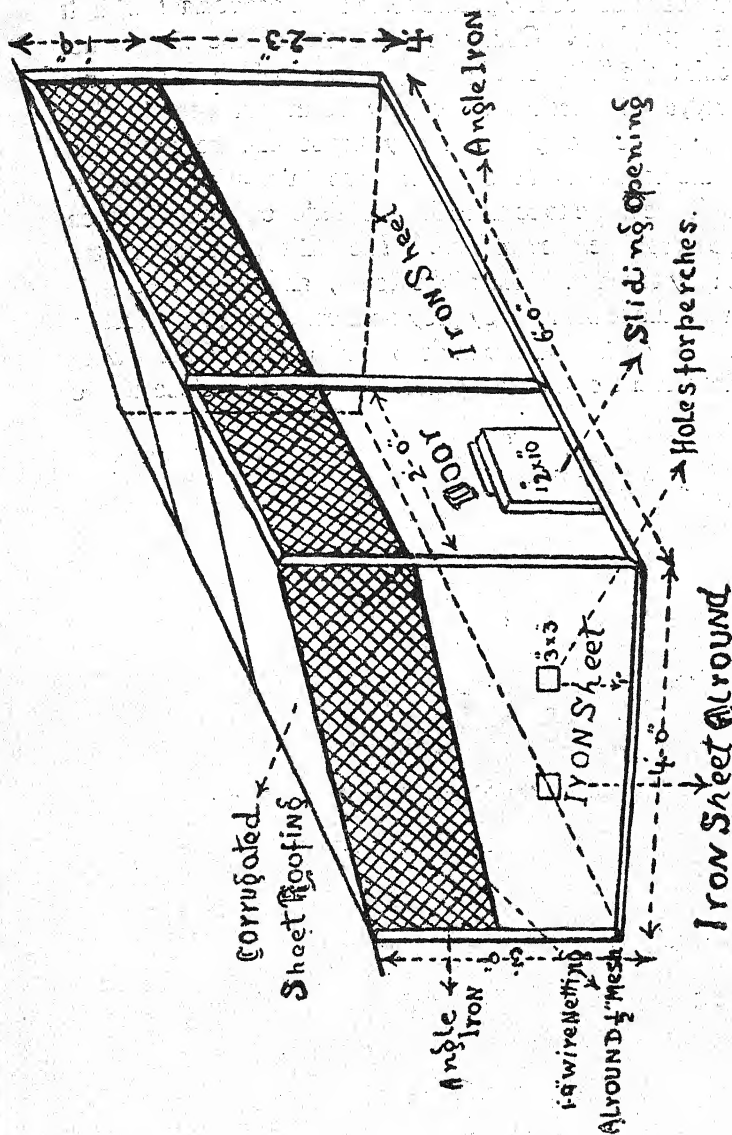
Tick-proof perches—All perches should be fixed on upright iron rods which should be driven into the ground to the necessary depth to give support (about two feet). To the

tops of the iron rods and about 3 inches below the perch, have small iron cups brazed or soldered on, keeping the cups always filled with kerosene oil. The perches should be at least a foot away from the walls so that the tails of the cocks do not touch the sides of the house. Perches constructed in this manner are proof against any insect pests attacking poultry at night.

A Simple And Efficient Tick-Proof Perch For Village Use—Let the perch, of any length you like, rest on 2 vertical supports. The bottom of these legs should be fastened to square flat boards, 8 inches square. These supports are now stood in kerosene oil tins which have had the tops cut out. Bricks and stones are placed in the tins and these resting on the flat board bases, keep the perch steady. Now fill up the tins with water and add a film of oil on top and the perch is perfectly insulated from all vermin.

Prevention Of Tick Fever—It is not likely that the fowls will contract tick fever if perches as described are put in and kept full of oil. In the case, however, of valuable imported stock, most authorities are agreed that one-third of a grain of Soamin, irrespective of the live weight of the fowl, dissolved in 1 c. c. of distilled water and injected will act as a preventive, but for what length of time is not known. One fancier in India, however, reported that Soamin though valuable as a curative agent was not so as a preventive, and another advised the injection of 2 grains instead of one-third as a preventive, more experimental work needs to be done on this subject, as the loss of fowls from ticks in India is very great.

Prevention is better than cure. The best preventive of all is to use "all-metal" poultry houses. It is my opinion from long experience, that the fowl tick whose bite causes "tick fever" or "spirochaetosis" is the cause of the greatest loss, and the reason for most amateurs giving up poultry keeping. Poultry are of course subject to many diseases, and in recent years the dreaded "Ranikhet disease" or "fowl influenza"



T. J. A. KEND

Scale. 2 ft. = 1"

FIG. 38A. ALL-METAL POULTRY HOUSE (USED ON THE SLATER POULTRY FARM, ETNAH, U. P.)

has caused great mortality, but the fowl tick is the arch enemy because but few people seem to be conversant with it or with tick fever. Complete eradication of the tick is not difficult if the "all-metal" poultry houses which I advocate be used, and if these are thoroughly burnt out occasionally. Tick-proof perches placed in any house can be used, but these are not nearly as satisfactory as "tick-proof" houses. Menials are liable to forget to fill the little oil containers on the tick-proof perches with oil. The tails of some of the birds may touch the sides of the house, and ticks thus gain access to the fowls for they prey on them at night, secreting themselves during the day in deep cracks etc., and the owner is quite unaware of their existence. Some fowls refuse to use

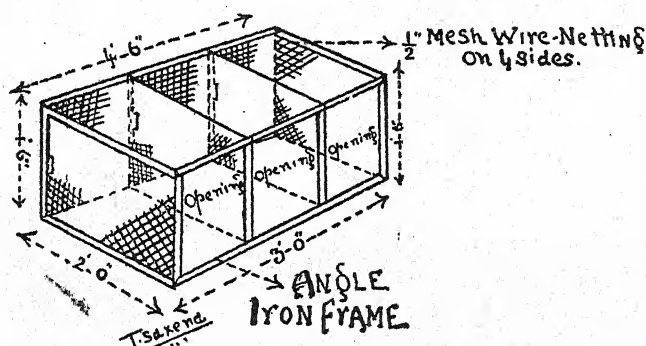


FIG. 38B. ALL-METAL TRAP NEST RUN.

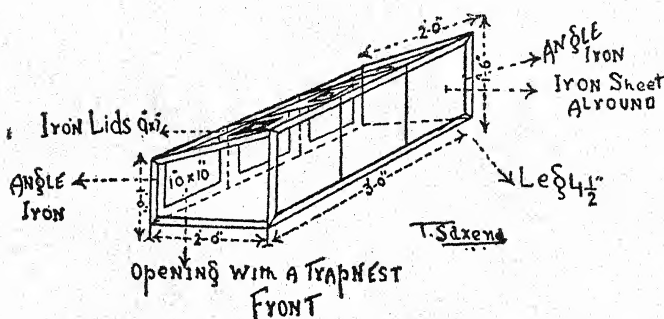


FIG. 38C. ALL-METAL TRAP NEST.

the perch. It is thus far better to install the "all-metal" house.

The writer in 1912 had heavy losses from tick fever. He, like most amateurs, mistook this disease for fowl cholera, as the symptoms in both cases are very similar. When he wrote to the Governments of the U. S. A., Australia, and South Africa for treatment etc. of tick fever, all the replies stated that in each country the keeping of poultry by the farmers almost had to be given up because of the losses caused by tick fever, and it was only when the all-metal houses were put into use, that the disease could be adequately controlled. This the writer did, and has used such houses ever since, with great success.

The all-metal house should be placed under the shade of a tree. To make it cooler, country tile may be placed on the roof, or even a thick layer of mud. Asbestos sheeting for the roof may be used instead of corrugated iron sheeting. At night the all-metal house is the coolest of all houses. The writer has lost very few fowls from "heat stroke" in such houses and by using them your tick problem is solved.

CHAPTER XVII

RANIKHET DISEASE

This dreaded and most contagious disease is of recent origin appearing in 1927 and 1928. It is known in India as Ranikhet, in England as Newcastle disease or Doyle's disease, Pseudo-fowl pest in Java, Korea and Egypt, and Avian pest in the Phillipine Islands. It has also been reported from Ceylon, Japan and Australia. In recent years outbreaks in India have suddenly swept away entire flocks.

Cause—The disease is caused by a filter-passing virus, which closely resembles the virus of fowl plague. The two diseases are however entirely different. Fowl plague has not yet appeared in India. The virus is present in the discharge from the beak, and in the droppings of the affected fowls.

Symptoms—The fowls show distress, standing in a crouching position with widely opened beak and heavy rapid breathing. Great thirst is evident and fever (the normal temperature of a fowl is 107-108 degrees F.) and yellowish white diarrhoea is present. It has an offensive odour. The crop is usually distended and contains sour undigested material. The beak fills with mucus. As the disease progresses, the fowls breathing becomes audible, and continuous short, sharp noises, somewhat resembling hiccoughs are made, at short intervals. Very great weakness soon occurs and death usually takes place in 2 or 3 days. Mortality is very high, about 98% to 100%. If a bird recovers it has immunity for life.

Transmission—It is transmitted from one fowl to another by contact with the mucus discharge of the beak, or from the droppings. The virus also adheres to the feathers. Healthy fowls contract the disease very rapidly by drinking water and eating food contaminated by the discharges of sick fowls. The disease may be introduced by birds brought in from out-

side, which may have come from infected areas, or may have carried the virus in their feathers. Fowls may pick up the infection in the railway brake van and a farm which has sent out perfectly healthy stock may thus be unjustly blamed. Infection may also be spread by attendants carrying it on their feet from infected places to healthy farms. Crows and birds may also cause infection, as in cases of an outbreak of ranikhet, dead crows are often seen in the yards.

Treatment and Control—No medicine has yet been discovered as a curative. The Indian Veterinary Research Institute Mukteswar, U. P. has given much study to the disease, and has prepared a vaccine. This is a great boon. (See end of chapter for latest information regarding vaccine. This is now available and can be secured from Mukteswar). Poultry keepers are advised to keep in touch with and write to this institution for help and advice.

Control consists of killing *at once* all affected fowls and burning and deep burying of all dead fowls. *Immediate* steps must be taken. To try and save a sick fowl is to lose all your flock. All unaffected fowls must be removed at once to a distant place. If the farm is a large one split them into several small units. The attendant of affected fowls must in no cases attend healthy flocks. Valuable birds may be housed separately in cages if possible. Add Permanganate of Potash to the drinking water making it a deep pink colour. Isolate all purchased or new stock on arrival for two weeks.

Disinfection—After an outbreak of ranikhet complete and thorough disinfection must be carried out. Fire is the best of all. Spread straw or dry sugar cane leaves on the yards, sprinkle a little kerosene and ignite. In small runs a painter's blow torch may be used, provided it is passed all over the ground. If it is not practicable to use fire, lime the ground heavily. Leave it for 2 to 3 days. Then remove two inches of the top soil, carry it all away and bury it. Burn the house and all appliances if not valuable and start afresh. Dig up the soil thoroughly after the removal of the top soil and plant

a crop. Do not bring fresh stock into the same site until three months have passed.

If appliances etc. are to be saved and not burnt, disinfect them thoroughly.

If an outbreak occurs immediately notify your Director, Civil Veterinary Services, and the local Veterinary Doctor, who will assist and advise on disinfection and control. Much progress has been made in the preparation of a vaccine as a preventive against this disease.

Extracts are given below taken from an article:—

"Vaccine against Ranikhet Disease" by J. A. Idnani, Indian Veterinary Research Institute, Mukteswar, which appeared in the *Indian Poultry Gazette*, February, 1946.

"In July, 1944 at the Government Poultry Farm, Lucknow, some 3000 birds were vaccinated and except for certain reactions to be described later, the undertaking was on the whole satisfactory.....The Central Command had developed large poultry farms for Military use and all the farms were placed at our disposal for carrying out large scale vaccinations. By the end of 1945 over 100,000 were vaccinated and quite valuable data have been collected..."

Observations showed that the vaccine is very sensitive to fluctuations of air temperature and must always be stored on ice, otherwise it deteriorates rapidly. Near freezing point, however, it remains quite safe for at least three months. Transport of vaccine from the place of manufacture and distribution centre must be done by reliable carriers, the vaccine being transported in thermos flasks containing ice which should be replaced preferably every 12 hours. The vaccine is normally supplied in hermetically sealed ampules, one ampule containing 1 cc. of concentrated vaccine represent one thousand doses (cost Rs. 2-10-0 per thousand doses).

Method of using the vaccine—At the time of use, the contents of each ampule are completely evacuated into a flask or other container holding 1000 c.c. of water (distilled,

tap or normal saline) which has been previously boiled and cooled on ice at the place where the operation has to be done. This diluted mixture is vigorously shaken and constitutes the vaccine ready for use. It must be kept protected from direct sunlight. Especially in hot weather when a large number of birds are to be inoculated, it must be preserved in a bucket containing ice and water. It is injected subcutaneously or intramuscularly in doses of 1 c.c. A good site in adult birds is under the fold of skin on the inside of the wing or in the case of chickens the leg muscles. Any vaccine not used on the day of preparation must be discarded.

All apparatus required for the operation should be sterilized before use.

Reaction in vaccinated birds—Ordinarily chickens not less than six weeks of age are suitable for vaccination. Thus chickens can be done with advantage when they are about to leave the brooder houses.

After vaccination birds may be expected to show some drowsiness from 3rd or 4th to 5th or 6th day. Later a small percentage (1-3 percent) may become severely lame or paralyzed. Birds so affected should be removed to a separate pen and if no signs of improvement are evident within the few following days they should be disposed of for table purposes. Birds showing only slight lameness or paralysis require no particular attention, as they may be expected to clear up in 10 to 14 days. Ordinarily a casualty rate of not exceeding 4 percent is expected.

Vaccinated birds exhibiting illness or symptoms of paralysis at a later stage, e.g., during the second or third week of the vaccination should be suspected for coccidiosis and necessary preventive measures taken.

If vaccination is done in laying hens, egg production will decline but will return to normal in 14 to 21 days.

Circumstances in which vaccination is indicated or contra-indicated—An active immunity is conferred some 48 hours

after vaccination. It is certainly of long duration but the vaccine possesses no curative properties. Vaccination should be performed in healthy flocks. It is in general inadvisable to carry out the inoculation in the presence of an actual outbreak of Ranikhet disease, owing to the risk of the operator and his assistants carrying the natural disease while in its incubation stage to unaffected birds. In certain circumstances it can be done, for instance when one portion of the flock is at the time quite free and is situated at some distance from the affected flock.

It is advisable to withhold vaccination against Ranikhet disease (a) if some other disease prevails in the area, (b) during the very hot months.

It will be understood that the disability to keep the vaccine potent under ordinary temperatures reduces the range at which it can be usefully distributed from any one manufacturing centre. To overcome this difficulty efforts are being made to create centres of manufacture throughout the country. The training of the necessary staff for these centres has commenced and has been completed in the Madras Presidency and Northwest Frontier Province. It is expected that as trained men become available, further centres will be established in other provinces. The work mentioned in this article was initiated and done by Mr. J. R. Haddow with whom the writer closely collaborated.

The Latest Development in Ranikhet Vaccine

Since the last edition of this book in 1948, great advance has been made in the manufacture of vaccine by the Indian Veterinary Research Institute (I. V. R. I.) at Mukteswar and Izatnagar, U.P.

In an International Co-operation Administration report (in India called TCM) on Veterinary Biological Production in India, published by the International Co-operation Administration (TCM) in Washington, D. C., U. S. A. in November 1957, we find the latest up-to-date information

on pages 79=80, I quote, "In India under the present system of poultry raising by the ordinary villager, vaccination of birds by intramuscular inoculation does not present any serious problems. The immunity resulting from effective vaccination has been quite dependable and vaccination in the face of an outbreak of the disease, if judiciously carried out, tends to check the spread of the disease and also to reduce the course of the disease. The 'Mukteswar' strain of virus has been found to be fragile and hence necessitated the storage of this vaccine at low temperature. The use of this vaccine, therefore, has been limited. *Since early 1953 a freeze-dried, vacuum sealed product containing the embryonic fluids and tissue of eggs infected with Mukteswar strain of virus has replaced the liquid vaccine. The freeze-dried product has been found to have a greater keeping quality and can be despatched by post without refrigerated condition, thus enabling the villager in the remotest corner to reap the benefits of scientific achievements.*"

Thus Mukteswar has given to India a great boon, and our sincere congratulations go to her for this outstanding achievement. As a lover of India and a well-wisher, I would personally thank Mr. C. Seetharaman, Head of Division of Biological Products (IVRI), Indian Veterinary Research Institute Izatnagar, U.P. and his associates for their splendid contribution toward the conquering of poultry disease in India. We wish him continued success in his noble efforts to help his country.

Again I quote from Mr. Seetharaman's paper (page 72 of the report), "Prevention is better than cure and so efforts should be concentrated to prevent the introduction of the disease into a farm. More important among the many precautionary measures are (1) to locate the poultry farm away from normal traffic, (2) to obtain the foundation stock from reliable sources or buy day-old chicks from a disease free farm, (3) to remove the droppings, remnants of poultry feed, chicken house bedding etc., to a place far off from the farm

to avoid birds having approach, (4) to provide an incinerator or a deep burial pit with lime, (5) to ensure general cleanliness through disinfection of chicken house and (6) to control wild free flying birds and rodents. Above all a correct diagnosis is the keystone of success in the control of the disease."

At the first sign of trouble, call in your local veterinary officer and inform your Director of Veterinary Services. They will help you. All orders for Ranikhet disease vaccine should be addressed to the Head of Biological Products Division, Indian Veterinary Research Institute, Izatnagar, U P. The telegraphic address is SERA, Izatnagar. The cost is Rs. 2/5/- per ampoule containing 200 doses.

The freeze-drying method has given us a potent, cheap and convenient product for the successful control and eradication of Ranikhet disease. This Freeze-dried vaccine keeps well for 7 days at summer temperature or 10 days in the cooler part of the year.

CHAPTER XVIII

A PORTABLE ALL-PURPOSE UNIT FOR THE BENEFIT OF THOSE WHO SUFFER FROM A SURFEIT OF TRANSFERS AND MOVES

(Reprinted from *English Eggs*
by Capt. A. W. T. Webb.)

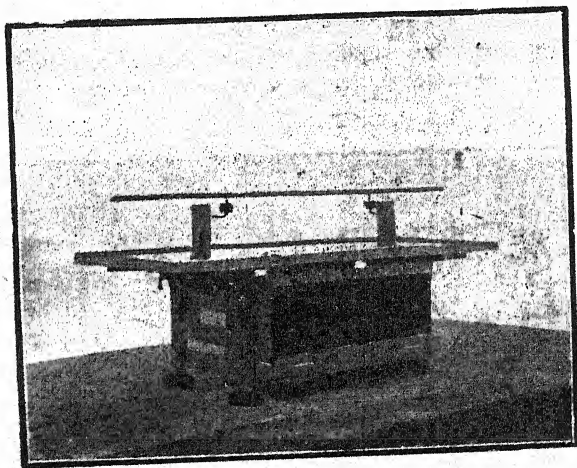


FIG. 39A.
PERCHES WITH TICK-PROOF BRACKETS, DROPPING
BOARD AND NEST BOXES.

N.B.—The legs of the table are kept close up to the sides of the nest box by a long iron hook stretching across the back from leg to leg.



FIG. 39B.

THE NEST BOXES PARTLY FOLDED SHOWING METHOD
OF CONSTRUCTION AND RETAINING BLOCKS



FIG. 39C.

COMPOSITE ILLUSTRATION SHOWING TICK-PROOF
ROOSTING TABLE FOR CHICKS (without rat-proof
cage), PERCH FOR COCKERELS (i.e., unit without
nest boxes) AND A BACK VIEW OF THE CONTRIVANCE
SHOWING HOW THE LEGS FOLD UNDERNEATH.

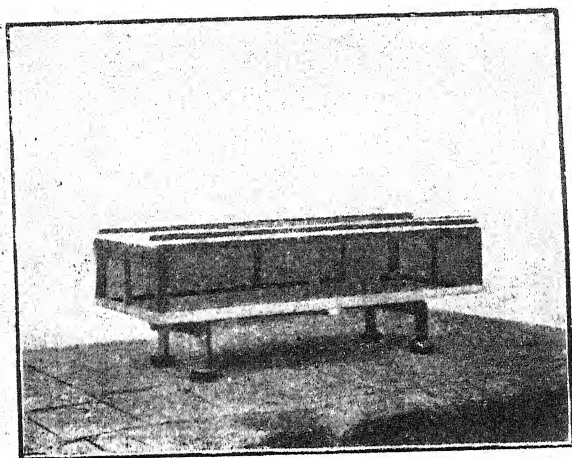


FIG. 39D.

TICK-PROOF ROOSTING TABLE FOR CHICKS WITH
RAT-PROOF COVER IN PLACE.

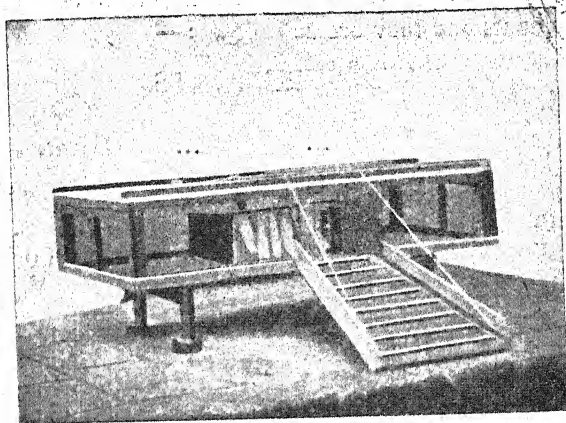
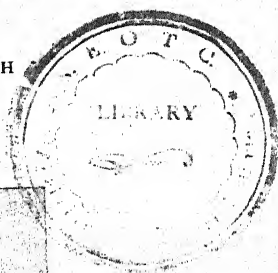


FIG. 39E.

THE CONTRIVANCE CONVERTED INTO A BROODER

Note the flannel hover placed inside and the arrangement to keep
the run-away just off the ground to prevent ticks crawling up.



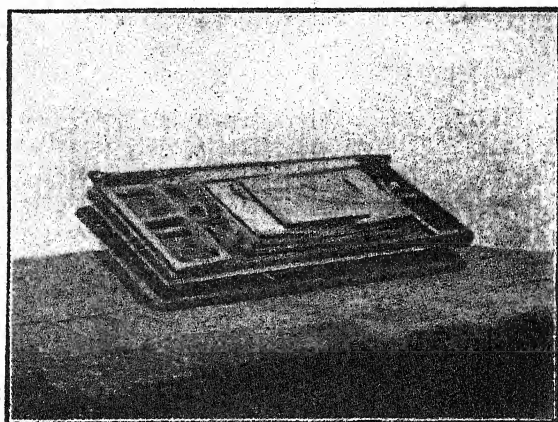


FIG. 39F.
THE WHOLE CONTRIVANCE FOLDED DOWN.

I do not propose to go into construction details here because I believe the illustrations given above are sufficient to make all clear. It should be ample to add only the measurements and they are as follows:—

MEASUREMENTS

TABLE.

Length	...	...	6 feet.
Breadth	...	...	2 feet.
Length of long legs	...	...	1 foot 5 inches.
Length of short legs	...	...	7 inches.
Distance between long legs	...	...	2 feet 8 inches.

PERCH.

Length	...	...	5 feet.
Breadth	...	...	2 inches.
Thickness	...	...	1 inch.
Height off dropping-board (table)	...	...	8 inches.

RAT-PROOF COVER.

Length	...	...	4 feet 11 inches.
Breadth	...	...	1 foot 11 inches.
Height	...	...	10½ inches.
Size of opening on top	...	...	2 feet × 1 foot.
Gauge of wire netting	...	...	½ inch.

NEST BOXES.

Length (outside measure)	...	2 feet 8 inches.
Breadth " "	...	1 foot 6 inches.
Height " "	...	1 foot 2 inches.

RUN-AWAY.

Length	...	2 feet.
Breadth at top	...	1 foot.
Breadth at bottom	...	1 foot 10 inches.

MATERIALS REQUIRED.

Teak strips 2×1 inches	...	40 feet.
Teak strips 1×1 inch	...	55 feet.
Match boarding $6 \times \frac{1}{2}$ inch	...	80 feet.
Hinges	...	10 pairs.
Wire netting ($\frac{1}{2}$ inch guage)	...	16 square feet.

It is believed that the following illustrations will all also prove most useful, as directions how to make them are included and they will help to make this revised and enlarged edition more useful.

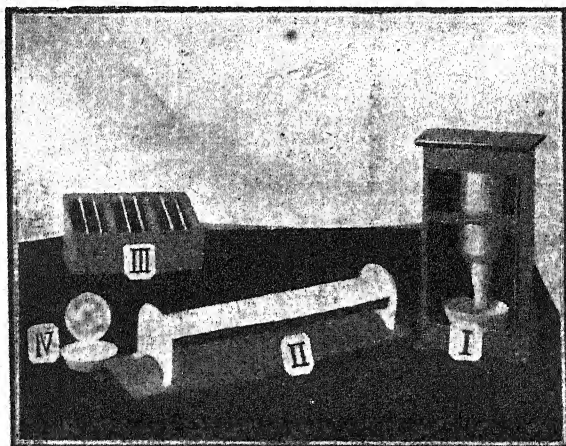


FIG. 40.

I—WATER FOUNTAIN.

MATERIALS:—About 5 feet of wood ($6 \text{ inches} \times \frac{1}{2} \text{ inch}$), an empty bottle, a short piece of wire and a small Japanese bowl such as can be bought in the Bazar for six annas.

MEASUREMENTS:—Height 16 inches ; Breadth 8 inches ; Depth 6 inches.

CONSTRUCTION NOTES:—Construct as per illustration and make the top removable for inserting the bottle. The bottle is supported by a wire hook fastened to the back of the box and so arranged that the mouth of the bottle is held about $\frac{1}{4}$ inch below the rim of the bowl. The wooden shelf holding the bottle must have a round hole cut in it slightly larger than the circumference of the bottle. The principle is that, as the water in the bowl is consumed, more (and fresh) comes down from the bottle, the pressure of the air preventing the water ever rising higher than the lip of the bottle.

II—FEEDING TROUGH

MATERIALS:—A piece of wood 2 feet \times 6 inches \times $\frac{1}{2}$ inch, and a kerosene tin.

MEASUREMENTS:—Base as above. Tin Trough 22 inches long, 4 inches broad and 3 inches high (to top of trough).

CONSTRUCTION NOTES:—The trough consists of two end pieces 5 inches \times 5 inches and one piece, bent in V shape, 5 inches \times 22 inches. The ends are soldered on and then the bottom edges of the end pieces are bent outwards to right angles drilled to take two screws each and the whole is screwed down on to the wooden base.

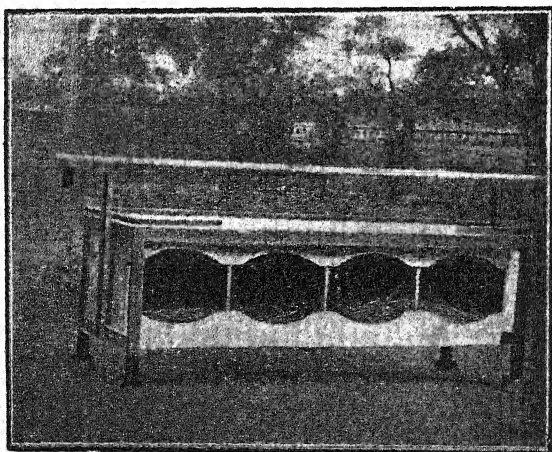


FIG. 41.

PERCH AND NEST BOX UNIT.

III—SHELL, GRIT AND CHARCOAL BOX.

MATERIALS:—About 5 feet of wood (6 inches \times $\frac{1}{2}$ inch) and about 4 feet of fairly stout wire.

MEASUREMENTS:—Height 5 inches at back and 3 inches in front ; length 10 inches ; depth 7 inches.

CONSTRUCTION NOTES:—Construct as in the illustration and fix wires to prevent the birds throwing out the contents on the ground.

IV—BABY CHICK FOUNTAIN

The principle of working is the same as in the Water Fountain illustrated and described above.

MATERIALS:—Match-boarding (6 inches \times $\frac{1}{2}$ inch) 54 feet. Strips for frame (2 inches \times 1 inch) 24 feet, one pair of tick-proof brackets.

MEASUREMENTS:—Perch 4 feet long. Dropping-board 4 feet \times 2 feet. Height from ground to dropping-board $1\frac{1}{2}$ feet. Nesting boxes each 1 foot \times 1 foot. Height from perch to dropping-board 6 inches.

CONSTRUCTION:—The illustration explains itself, but economy will be effected by providing three nest boxes instead of four which is quite an unnecessary number I find. In this case, the under frame-

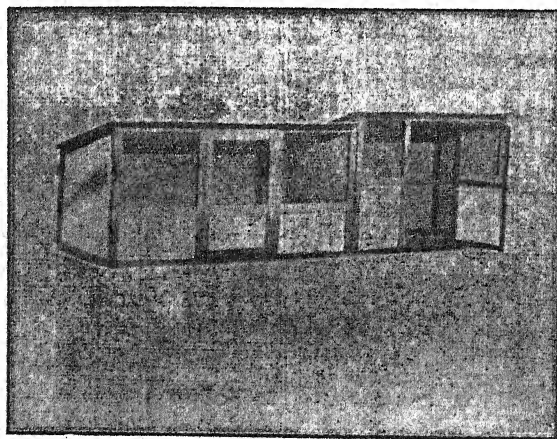


FIG. 42.
PORTABLE FOWL-HOUSE WITH SCRATCHING SHED.

work will be $1\frac{1}{2}$ feet high, 3 feet long and 1 foot broad. The details given under "Materials" are based on the assumption that this suggestion will be followed. As in this case the dropping-board will be 1 foot longer and 1 foot broader than the under framework, it will be necessary in order to support the protruding portions to nail on under the dropping-board three strips each 2 feet long.

To prevent ticks the writer would suggest that thin sheet iron or tin (tarred) be used for construction instead of wood. If wood is used oil it thoroughly, both inside and out at frequent intervals.

MATERIALS:—Teak strips (2 inches \times 1 inch) for framework 180 feet. Asbestos sheeting 5 pieces (4 feet \times 4 feet). Teak or Mango planking for roof (9 inches \times $\frac{1}{2}$ inch) 45 feet.

MEASUREMENTS:—House length 4 $\frac{1}{2}$ feet. Height at front 3 feet, height at back 2 feet 2 inches. Depth 3 feet. Shed, length 6 feet, height at front 34 inches, height at back 26 inches, depth 3 feet.

CONSTRUCTION NOTES:—Each side and the roofs are to be made separately and later screwed together. These erecting screws must be well countersunk and covered in with wax to prevent rusting and to allow of easy removal. In the left side of the house and in the right side of the scratching-shed small trap doors, facing each other, should be provided for entry into the shed from the house and vice-versa.

MATERIALS:—Teak strips for framework (2 inches \times 1 inch) 85 feet. Match-boarding for roof and bottom (6 inches \times $\frac{1}{2}$ inch) 55 feet. Asbestos sheeting 54 inches \times 14 inches. A small quantity of $\frac{1}{2}$ inch wire netting.

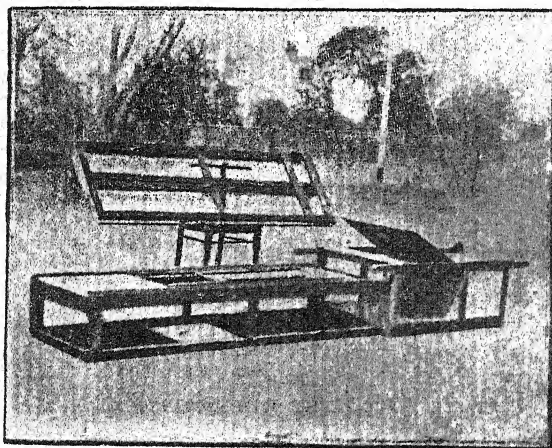


FIG. 43.
BROODER AND RUN FOR BABY CHICKS.

MEASUREMENTS:—Run 7 feet long, 1 foot high and 2 feet broad. Brooder 5 feet long including handles (each 8 inches), 1 foot 4

inches and 2 feet 2 inches broad. The inner brooding chamber is 1 foot 6 inches long.

CONSTRUCTION NOTES:—As will be seen from the illustration, the brooder is divided into two chambers—an inner brooding chamber in which the flannel HOVER (Figure 44) stands and a scratching room. The partition between the two has a small opening with a sliding perforated zinc door for ventilation. The roofs of the brooding chamber and the scratching room are on hinges to allow of easy cleaning of the inside of the brooder.

As for the run, the three sides are each made separately and can fold down for packing. The illustration shows one run thus folded down. A sliding door or panel is provided in the roof of the run and entry to the run from the brooder is gained by a sliding door at the end of the brooder.

MATERIALS:—A piece of wood 20 inches \times 14 inches \times $\frac{1}{2}$ inch, $\frac{1}{2}$ yard of flannel and piece of canvas (or other stout material) 20 inches \times 14 inches.

MEASUREMENTS:—Top 20 inches \times 14 inches. Height at front 7 inches and 5 $\frac{1}{2}$ inches at back.

CONSTRUCTION NOTES:—Make the wood work as in the illustration. Then cut the flannel into strips 1 or 1 $\frac{1}{2}$ inches broad and 1 foot long. About 90 strips are sufficient. Next make pairs of holes in the canvas close together in lines: ten lines of the holes are required with nine pairs in the front five lines and ten pairs in the back five lines. Take each piece of flannel and thread it through one hole of each pair and out of the others so that two strips of flannel hang down both of equal length. Insert thus all the strips of flannel and tack the canvas to the inside of the roof. The object in having the hover on a slope and of having more strips in the back lines than in the front lines is to allow variations of temperature, i.e., the further back the chick goes the warmer it can be and vice-versa.

MATERIALS:—Teak strips for legs and cross pieces (2 inches \times 1 inch) 11 feet. Match-boarding (6 inches \times $\frac{1}{2}$ inch) 20 feet. Two iron hooks 8 inches long.

MEASUREMENT:—Table 5 feet \times 2 feet. Legs 8 inches long.

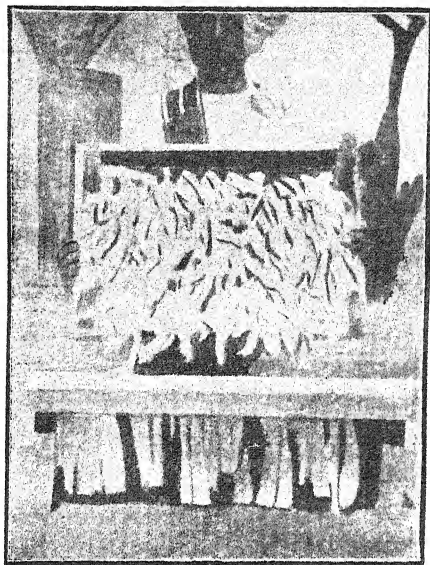


FIG. 44.

FLANNEL HOVER FOR BROODER.

CONSTRUCTION NOTES:—The illustration explains itself. The narrow beading round the edge of the table is necessary to keep the ashes or sand in place and these should be thickly sprinkled over the boards to soak up the droppings.

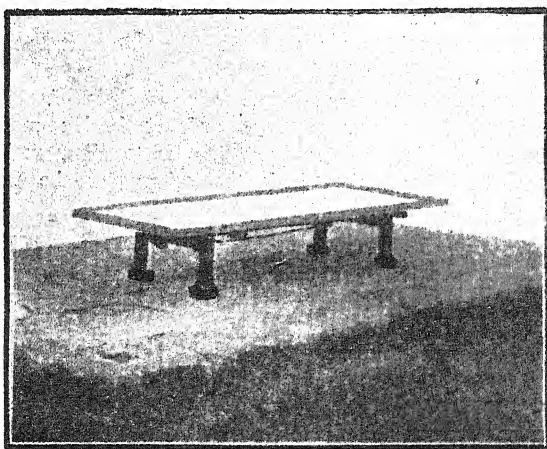


FIG. 45.

TICK-PROOF ROOSTING TABLE FOR CHICKS.

CHAPTER XIX

ANTIBIOTICS AND VITAMINS

Antibiotics—Recently there has been a great deal of research on antibiotics in the U. S. A. An antibiotic is produced from yeasts, molds and bacteria. It prevents the growth or activity of harmful bacteria. There are several antibiotic drugs, including the sulpha drugs, penicillin, aureomycin, streptomycin and terramycin. Mention has already been made of the great value of terramycin added to the drinking water of chicks, to fight disease *inside the chicks* and to *sterilize the drinking water*. In this country antibiotics are easy to procure and are added to food formulas and they are used widely. In India, however, I am afraid that financially they are beyond the reach of most poultry keepers, though they should prove valuable for use on Government and State farms. For general all-around use, penicillin is as good as any and is the cheapest. It should be used at about the rate of five grams per ton of feed for young chickens. There is no need to include it in the feed for mature hens.

Vitamins—Vitamins are also receiving a great deal of attention in the United States in regard to human and animal nutrition. Since 1911 it has been proved that the vitamins in food are *essential to health and growth*. I expect the purchasing of vitamin concentrates is out of the question as far as India is concerned, except perhaps for large commercial farms and Government or State farms. However, you will notice that I have again and again in this book, stressed the *vital importance* of green feed for poultry, chicks, growing stock, layers and breeders. Mention has also been made of the value of meat and if religious susceptibilities prohibit its use, then fish meal. All meat and fish meal, especially fish

oil as cod liver oil are sources of vitamins. If directions given in the book are followed, this will help a great deal in the overcoming of vitamin deficiencies of all kinds. Fresh green grass or even fresh green leaves of any kind usually abound in vitamin A and in B vitamins. And, of course, sunshine is a very good source of vitamin D. During times of the year, as in the hot weather, when fresh green grass is not available, the writer has found that sprouted barley is excellent; the sprouts are succulent and palatable and much relished. The barley will sprout in about three days if kept moist and warm. Take care that it does not mould. This will help enormously to prevent vitamin deficiencies. Soy bean meal, ground nut meal if included (as has been recommended in feed formulas already given) are also valuable sources of vitamins.

Some of the more Important Vitamins—Space does not permit my mentioning all for there are many. Vitamins are sometimes called "spark plugs"—they are essential for growth. A, C, D, and the B complex (which includes thiamin, riboflavin and niacin) are among the most important. Thiamin is sometimes called the "appetite vitamin" because a deficiency of it causes a loss of appetite. It is also called the "pep vitamin."

A diet rich in riboflavin helps to protect against disease. It is obtained from meat, from soy beans, and green and leafy vegetables.

Vitamin D prevents leg weakness and rickets. The body produces vitamin D in the skin when it is exposed to sunshine. It is sometimes called the "sunshine vitamin".

Dietary Deficiencies—Dietary deficiencies should not occur if proper attention is given to the information on feeding. In India, however, this is not done. Meat is not usually fed, though it should not be difficult to secure white ants. Green food is seldom fed by the villager. Because of these things, I have seen in India chickens and mature poultry with a "staggering gait" due to vitamin A deficiency.

Rickets is due to vitamin D deficiency. Rickets (leg weakness) is a constitutional disease of children and chickens generally due to deficiency of calcium salts in the food and marked by malnutrition and by softness and curving of the bones. "Curled-toe" paralysis is common in young chickens due to riboflavin deficiency. I have seen many poultry brought into shows by villagers with slipped wings. This is due to manganese deficiency or to careless handling and catching.

Egg production is limited by deficiencies of vitamins A and D and calcium (lime) and hatchability by deficiencies of vitamin D, riboflavin and manganese.

Feather picking and cannibalism are related to diet and also to management. They are likely to occur in birds that are over-crowded and fed diets low in fiber, meat or in salt. Very often feather picking and cannibalism can be stopped by adding 2 percent of salt to an all-mash diet or 4 percent to a mash that is being fed with grain, or simply by sprinkling salt over the mash in the hoppers. This treatment should not be continued longer than 2 or 3 days; continuous feeding of a diet high in salt is injurious.

Egg eating may be the result of overcrowding, an insufficient number of nests, or deficiency of calcium (lime) or vitamin D. It is not readily corrected by changing the diet. If only a few hens in a flock have acquired this habit, as is often the case, it is probably best to dispose of the offenders.

CHAPTER XX

POULTRY PRODUCTION AND DEVELOPMENT IN INDIA

In bringing this book to a close it is only fitting that recognition should be made of the good work and great assistance rendered to India in the matter of Poultry Production and Development and Veterinary Biological Production.

We refer to the work of the Technical Cooperation Mission (T. C. M.) and to the Food and Agriculture organization of the United Nations (F. A. O.). We are indebted to these agencies and would thank them.

Readers who wish to see just what has been done are referred to the book "Poultry Development in India and T. C. M. Aid" by Dr. E. R. Halbrook, New Delhi, 1958. You are also referred to the Veterinary Biological Production in India International Cooperation Administration (which in India is known as the T. C. M.); Washington 25, D. C., November 1957.

It is encouraging to learn that in India's Second Five-Year Plan, advance has been made in regard to poultry production. I will mention the major T. C. M. contributions which I quote from Dr. Halbrook's publication :

"A plane load of 30,000 White Leghorn and Rhode Island Red chicks plus 24 cases of hatching eggs from some of the best breeders in the U. S. were flown to India by T. C. M. in 1957 to serve as foundation breeding stock for poultry development under the Second Five-Year Plan.

"These chicks were shipped to state poultry farms all over India where they are being further multiplied and distributed to village poultry keepers.

"T. C. M. has provided incubators, feed mixers, brooders, scalders and pickers, refrigerators and freezers, egg graders, candlers and cleaners, etc., to five regional farms and 400

incubators of 416 egg size to 300 development extension centres.

"Six selected trainees have so far been sent to the U. S. A. to study and observe poultry development in that country in order to aid in the training of leaders in the poultry field.

"A well known U. S. poultry technician served for approximately three months as a consultant in helping to develop the T. C. M. aid program and four poultry technicians have been assigned on two-year contracts."

To further Veterinary Biological production, Mr. Oliver A. Bauman, Jr., Research Advisor—Biologies, was assigned by the government of the U. S. A. to India on a four year assignment as Veterinary Biological Advisor to the government of India, on the Production and Standardization of Veterinary Biological Products, and also two commercial production specialists. These services were provided by the U. S. Technical Cooperation Mission to India (T. C. M.).

An important advance in regard to control of Ranikhet disease, by means of a freeze-dried vaccine, was made in 1952 when the freeze drying equipment was installed through the courtesy and help of the Food and Agriculture Organization of the United Nations (F. A. O.)

India indeed has reason to be grateful for the help of the T. C. M. and the F. A. O. for their untiring efforts in regard to Poultry Development and Production and Veterinary Biological Production.

Those interested in learning more about advances in Poultry Production are referred to the following report—"Report of the Technical Meeting on Poultry Production in Asia and the Far East", held at Poona, Bombay State, India, 17-27 October, 1955.

Another more recent publication is Poultry Keeping by Dr. Naidu, and published by the Indian Council of Agricultural Research, 3 Queen Victoria Road, New Delhi.

Another good recent publication is "Poultry Development in India," prepared jointly by Dr. E. R. Halbrook of

T. C. M. and Dr. Tulsa Ram of the government of India, (August, 1958). It is published by T. C. M. American Embassy, New Delhi, India.

In the Indian Poultry Gazette, Vol. XLII, No. 2, July 1958 is an informative article on pages 3-9 entitled "Proceedings of the Third All India Poultry Breeders Conference, held on March 15 and 16, 1958 in conjunction with the All India Cattle and Poultry Show, New Delhi."

Speaking on the occasion Shri M. V. Krishnappa, Union Deputy Minister of Agriculture said, "Since 1955-56 the development of poultry has begun receiving special attention. It was during that year that a pilot scheme was launched and 33 development centres were set up.

"On the basis of the experience gained by working out pilot projects, an All India Poultry Development Scheme was formulated under the Second Five Year Plan. This scheme aims at the establishment of 300 demonstration and extension centres and the establishment of five regional farms at a cost of Rs. 258.1 lakhs. The regional farms alone would entail an expenditure of Rs. 41.20 lakhs. These farms will be located at Delhi, Simla, Himachal Pradesh, Bombay, Hassan, and Mysore in Mysore and Calcutta.

"The primary function of regional farms will be to maintain acclimatized stocks and supply "day-old" chicks to the states in the respective regions for the purpose of setting up poultry extension centres. They will also serve as centres for training personnel required for manning the extension centres and poultry development blocks. The regional farms will also carry out applied research on problems poultry husbandry, such as breeding, feeding and of housing.

"The Delhi Poultry Farm is being converted into a regional farm. The 30,000 chicks received under the Technical Co-operation Mission's aid and program were reared at the Delhi Farm before distribution to other centres.

"Briefly, I have given you an idea of our plans. But our

plans can succeed only if we get the whole-hearted co-operation of you all."

Concluding Shri Krishnappa re-emphasized the food value of the egg. He said, "We must have a well built nation. It was not possible to get the requisite of milk. The food, therefore, could be supplemented with eggs, which had food value equivalent to 10 ounces of milk." Even the poorest of the poor, he added, could afford to keep two or three hens.

"Poultry has been so much neglected in this country that its value is not appreciated by the general public. Egg is an important food containing proteins which are very essential for proper and balanced diet. Ours is generally known to be a vegetarian country, but I am sure the majority even today are not so-called vegetarians. I have seen people who are vegetarians but who when told that the egg can also be a vegetarian egg, because the hen produces it even without the cock, they do not hesitate to take it."

He said, "We should either take milk or egg." It is not possible to supply the requisite quantity of milk. In poultry there is scope and potentiality for multiplication in a short period.

Spot-lighting the importance of the egg and poultry, he said that about 30,000 chicks supplied under the T. C. M. were showing very good results. They had been distributed to all the states.

"The conference concluded with a vote of thanks to the chair."

Conclusion—We all want to succeed. You want to succeed with your poultry. So, let us mention, "The Key to Successful Poultry Keeping : Good Chicks. Good brooding. Good feeding. Good Housing and Management. Good Marketing."

"A summary of poultry recommendations :

1. If interested in poultry production, request help from :
 - (a) your block development officer, or

- (b) your state poultry development officer, or
- (c) your national poultry development officer.

2. Start right and keep on the right road to successful poultry production by :

- (a) improving your desi flock or starting with chicks of an improved breed.
- (b) rearing in confinement or semi-confinement.
- (c) providing adequate equipment and housing.
- (d) protecting them against diseases by vaccination and sanitation.
- (e) culling and selecting through the growing and laying periods.
- (f) feeding a balanced ration to promote optimum growth and maximum egg production.
- (g) producing high quality eggs and poultry and then asking a better than average price for better quality."

The above excellent advice is taken from "Poultry Development in India."

We conclude this book with wishing you all success and good luck. Produce more eggs, sell more eggs, and eat more eggs. Work hard, and be honest in all your dealings.

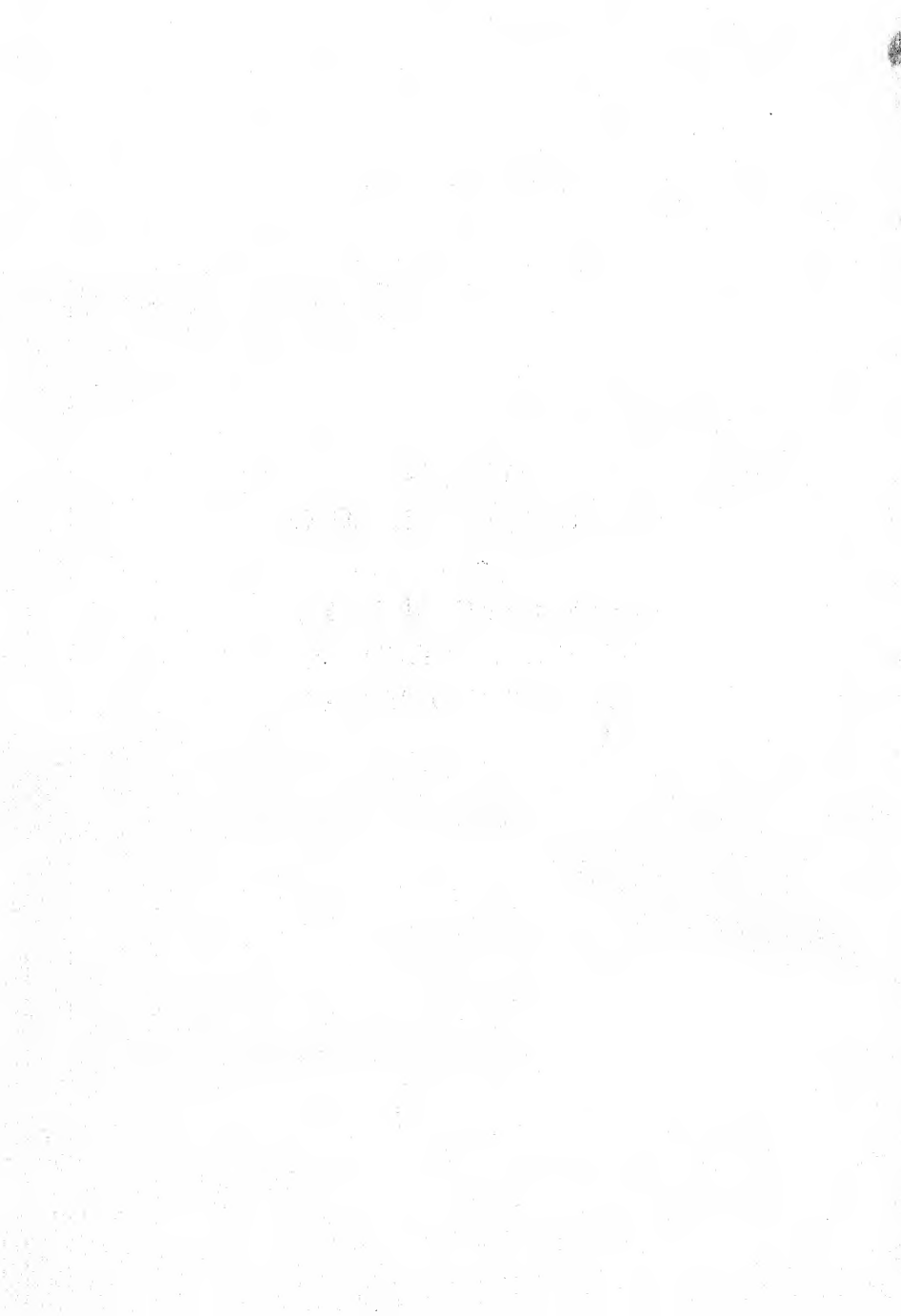
A. E. SLATER

Cedar Falls, Iowa

U. S. A.

VOLUME TWO

TWEED'S
THE INDIAN HANDBOOK
ON
DUCKS, GEESE, TURKEYS,
GUINEA-FOWLS, PIGEONS,
PEA-FOWLS AND RABBITS.



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3, Esplanade East, Calcutta-1.

PREFACE TO THE FIFTH EDITION

It gives me great pleasure to revise this book. As a boy I kept as pets, when living in India, rabbits and pigeons. Years later when I returned to India to carry on my life work, I kept ducks, geese, turkeys and guinea-fowls, so I have had practical experience in the handling of all of these. I can therefore, say that the information given by Isa Tweed is sound and as true today as when it was written.

All children need pets and rabbits and pigeons make splendid ones. Moreover, they can both supply good wholesome and tasty meat.

If one is near water he should try ducks. They are hardy and suffer much less from disease than do chickens. Some of the meat varieties mature rapidly and some of the egg breeds are very good layers.

Geese can only be kept if you have a large area of land. This is generally true of turkeys also, but in the U. S. A. many large commercial turkey farms are breeding and keeping turkeys in confinements.

Guinea-fowls besides being very tasty to eat, and the eggs rich in flavour, are very good "chowkidars" as well as being hardy, seldom sick, and costing very little to feed. But one needs a good amount of land for them to roam over with plenty of bushes and shrubs for them to take cover in.

This book has been thoroughly revised and goes out with the hope that the information given will afford one both pleasure and profit.

A. E. SLATER

Cedar Falls, Iowa
U. S. A.

PREFACE TO THE FOURTH EDITION

Like poultry, the stock of ducks, geese, turkeys, etc. in India have much diminished. The demand has been great, caused partly by the large numbers required by American and other troops in India during the war.

In these days of exceptionally high prices for all food stuffs, all who are able to do so, should keep a large number of ducks, pigeons, rabbits, etc. for table use, while those in the mofussil, with extensive grounds, should keep turkeys, geese and guinea-fowls.

Ducks are not subject to disease like fowls, and do not have cholera, roup, lice etc. By following this book, a person can make a success of raising ducks, when with fowls it takes years of experience to do so.

No other poultry can so easily look out for themselves as geese and young goslings. They require very little care and are raised almost exclusively on grass pasture or other green forage.

Turkeys are very profitable if the grower understands the correct method of breeding, hatching and rearing. Especially are they adapted to general farms, as they range widely.

Guinea-fowls are very hardy, are self-supporting and delicious eating, resembling game. They do especially well in large orchards where they destroy many injurious insects.

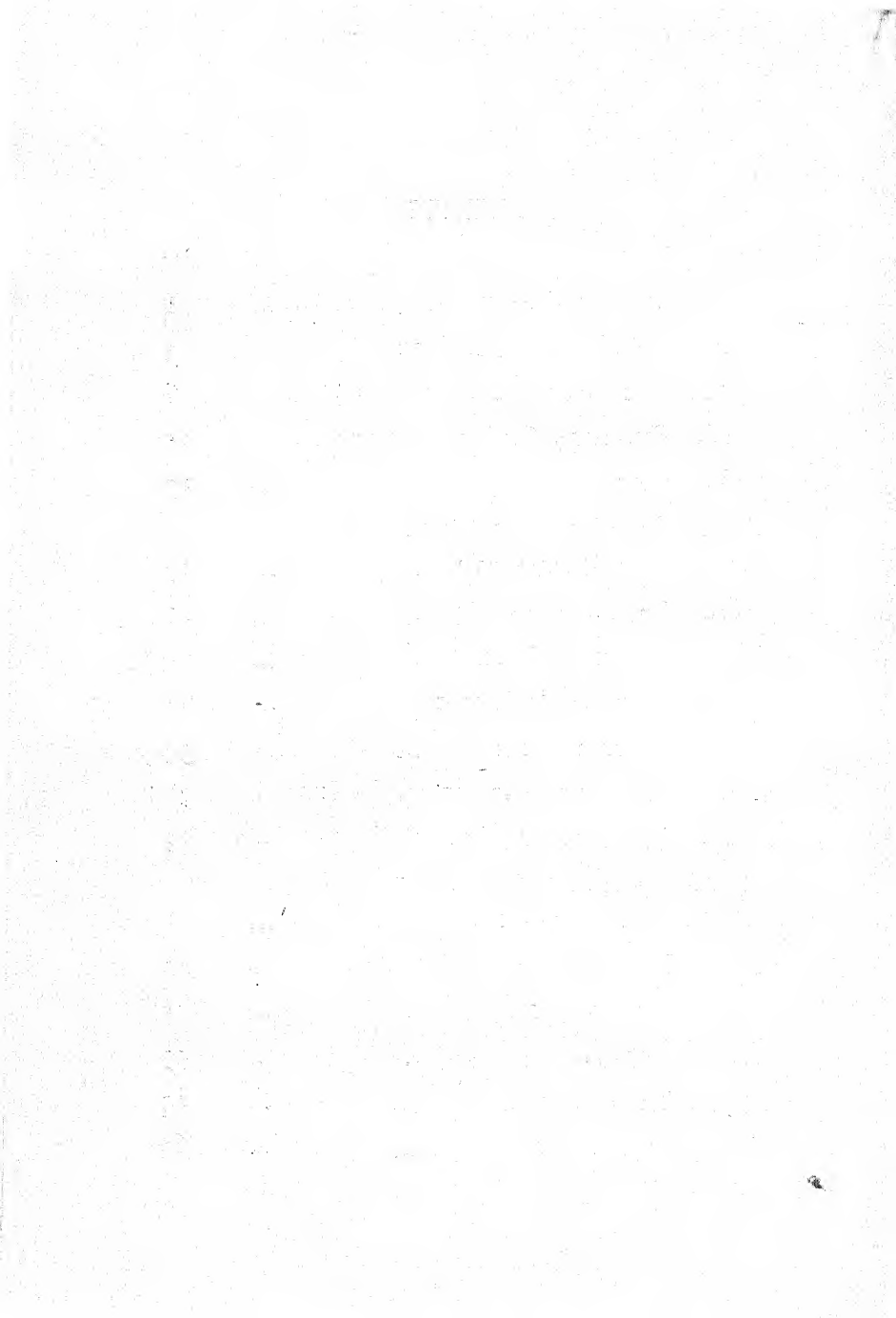
Pigeons and rabbits multiply very rapidly, and are easy to keep. They cost little and give quick food returns.

A. E. SLATER

Mission Poultry Farm
Etah, U. P.
July, 1948.

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CHAPTER I

KEEPING DUCKS

The people of India raise a large number of ducks for the market. High caste Hindoos and Mahomedans as well as Christians eat ducks and ducks' eggs. But Indians adopt no proper methods for breeding and rearing, and the consequence is that most of the ducks we see in this country are deteriorated diminutive specimens and the ducklings are very delicate and difficult to rear.

The small country duck is plentiful and cheap it is true, but there is no reason why better birds should not be kept nor why the common duck should not be improved. Breeding and rearing ducks in India is not at all a difficult matter, and it is very easy indeed to keep them. The construction of a proper house does not cost much, land is cheap and there are numerous tanks and ponds, so that in India we have every facility for keeping and rearing ducks.

Ducks will thrive on any soil so long as they have access to water. A running stream is certainly the best for them, but any tank or pond will do so long as it does not run dry in the hot weather. Even where there are no tanks and ponds ducks can be successfully reared for the table if they are given a large vessel with water in which they can bathe. The water should be renewed three times a day.

The initial outlay for a first class breeding pen of ducks will probably not be a small item, good birds of first class breeds cannot be had for nothing, though the price of a drake and four ducks may be something between fifty and one hundred rupees, that amount of money will be recovered four times over in twelve months by the sale of surplus stock and the stock reserved will be sufficient to increase the breeding pens fourfold.

There are but few pure bred ducks in India. Those desiring to purchase, might apply to one of the zoos, say at Calcutta, Lahore, or Lucknow. The Agricultural Institute, Allahabad, also keep ducks.

Many ducks are also to be found in Kashmir, particularly around Srinagar.

There are many commercial duck farms in the U.S.A. Some duck farmers raise as many as 500,000 ducks a year.

The Peking duck is almost the only duck raised on commercial farms, as it is the most important meat duck.

CHAPTER II

DUCK-HOUSE AND YARD

The Duck-House should always be built on the banks of a tank, or as near a tank as possible on rather high ground. There is no gainsaying the fact that ducks will not breed properly as mating takes place in the water unless they have a tank or large pond to which they can have frequent access. Any sort of a tank will do so long as there is water in it all through the year. A house should be built as near this tank as possible.

Either a pucca, thatch or wood house will do, but the floor of the house must be pucca. A house twelve feet long, eight feet wide, and eight feet high will be large enough to accommodate twenty-four large ducks. In building a duck-house it should always be borne in mind that ducks soil their house very much, and they should never be crowded together. Ample room and proper ventilation are absolutely necessary. Perfect cleanliness must be insisted on. Fowls or other birds must never be kept in the same house with ducks.

The house should face the south and have a wide door frame with half-inch mesh double wire-netting stretched across it. The house should be walled up on the east, north, and west, but there should be an open space about a foot deep all around between the roof and the wall. This space should be protected by good stout one-inch mesh wire-netting, so as to prevent animals and thieves entering at night. The floor should slope towards the door so that it can be easily washed and dried. A good layer of clean sand should be placed on the floor and some soft dry straw or grass should be spread over the sand.

Yard—A certain portion of the ground in front of the duck's house should be enclosed with two-inch mesh wire-

netting. An enclosure 20 feet by 24 feet will be large enough for twenty-four large ducks. The wire-netting around this enclosure should be six feet high and the top of the entire enclosure should be covered with wire-netting. Unless this is done, it will be impossible to prevent crows taking away the eggs from the enclosure. Frequently the eggs will be dropped in the yard in the morning before the ducks are allowed to go out to the tank.

The ducks should be let out into this enclosure early in the morning and fed. They should be kept in until at least 10 o' clock when they should be allowed to go into the tank.

The floor of the covered run should be covered with a thick layer of sand or earth. The floor should be sloped so that no water may lodge there.

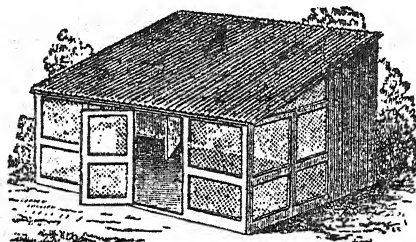
Pond—When a tank is not available for the ducks, a pond must be built for them. In such a case the enclosure or yard should be made as large as possible. A yard 25 feet wide and 125 feet long will do for twenty-four ducks. In the centre of this yard a pond 12 feet by 6 feet and 3 feet deep should be built. One side of the pond should be gradually sloped down from the top of one side to the bottom of the other side so that the birds can walk in and out of the water. This pond should be filled with clean tank water and be cleaned out and refilled every week. A properly constructed drain should connect with the pond and carry away all the dirty water to a distance from the house and yard. The dirty water should never be thrown in the yard. It is, however, very good for trees and plants in a garden and should be used for that purpose.

Ducks can be kept in perfect condition in a properly constructed house and yard, but if the house and yard is unsuitable, the ducks can never be expected to do well.

When ducks are not allowed to go into a tank, great care should be taken that there is plenty of grass in the run. A lot of gravel and small snails should be placed at the bottom of the pond.

Shade—Adult ducks need no protection from rain, but they cannot stand the rays of the midday sun. If there are no trees and shrubs in the yard, a shed must be provided for shade. The best way to provide shade is to plant graft mango trees, jack fruit trees and some small bushy shrubs in the yard. Lime trees and *neem* trees planted close together afford good shade.

Cleanliness—The food and water troughs, the house and the yard, and the pond must be kept absolutely clean. Ducks will not thrive if kept in an unclean condition. The food trough must be thoroughly cleaned and washed every day. The straw in the house must be shaken up and put out in the sun to dry, and the house and yard properly swept every day. The house should be properly washed at least once a week. The earth in the yard should be dug up and turned over twice in the year. The duck-pond should be cleaned out and re-filled every week. The straw in the house should be renewed every week or in ten days and Phenyle powder should be sprinkled on it to disinfect it and keep down vermin.



A HOUSE FOR DUCKS OR GESE.

CHAPTER III

THE DIFFERENT BREEDS OF DUCKS

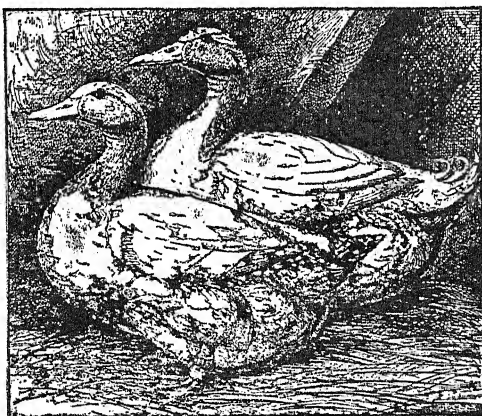
Tame or domestic ducks are divided into three kinds :

- (1) Those bred for meat.
- (2) Those bred for their eggs.
- (3) Those bred for their fancy appearance.

Domestic fowls except for the Muscovy duck are all descended from the wild mallard.

I will describe the eight best breeds, any one of which can be most profitably kept in India.

The Aylesbury Duck—The Aylesbury duck is named after the town in England where ducks are very largely bred and sold. The Aylesbury is pure white in plumage ; its eyes



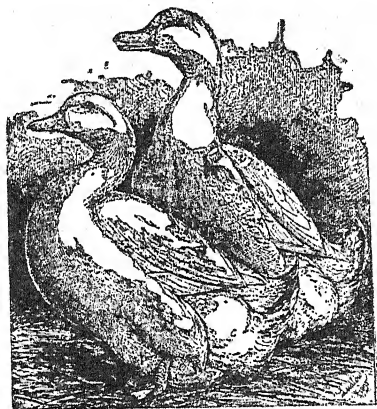
THE AYLESBURY DUCK.

are black , its legs orange or light yellow , the bill flesh colour, but when exposed to the sun the bill turns yellow. The body is long and flat and the feathers are close.

The Aylesbury is a splendid duck for the table. A fair weight for drakes is seven pounds and for ducks, six pounds. Some birds have weighed a great deal more and some ex=

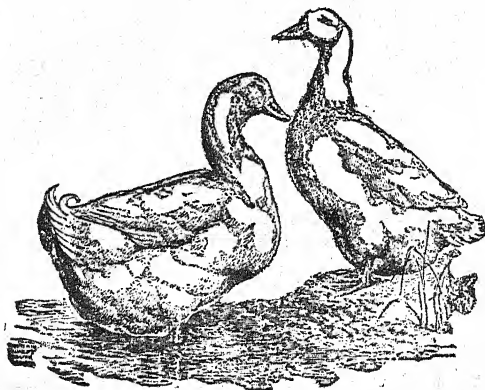
hibition birds have weighed over twenty pounds a pair. A very large heavy drake is not suitable for breeding. If a duck is very fat her eggs usually are infertile. For breeding purposes, select large and active birds between 12 and 24 months old.

The Aylesbury is a fair layer. It grows quickly and is very hardy and easily reared. Exhibition birds sell for £3 to £20 each.

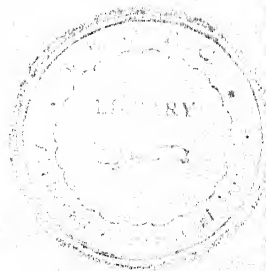


THE PEKIN DUCK: ENGLISH TYPE.

The Pekin Duck—The Pekin duck is creamy white and nearly as large as the Aylesbury. This breed originated in



THE PEKIN DUCK: AMERICAN TYPE.

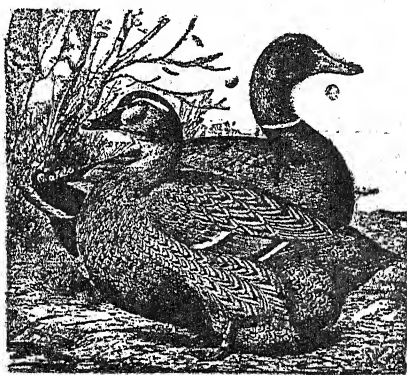


China, as its name implies, but in both England and America it has been bred to its present state of perfection.

The Pekin has yellow bill and legs and is different in shape to the Aylesbury, the body being more upright in carriage, while the feathers are loose like the Cochin fowls. It takes a longer time to mature and is much more easily handled than the Aylesbury. But it is not such a good table bird and it is, however, a better layer.

The proper weight for a drake is seven pounds and a duck, six pounds, though a great many do not weigh as much as this. The Pekin is less nervous and more hardy and active than the Aylesbury, and is very easily reared but does not bring as much money. A fair price in England is from £2 to £3 for a pair of first class breeders (Pre-war rates).

The Rouen—The Rouen is the handsomest of all varieties of ducks. It is bred very largely in England. It takes longer to arrive at maturity and does not grow as rapidly as many



THE ROUEN.

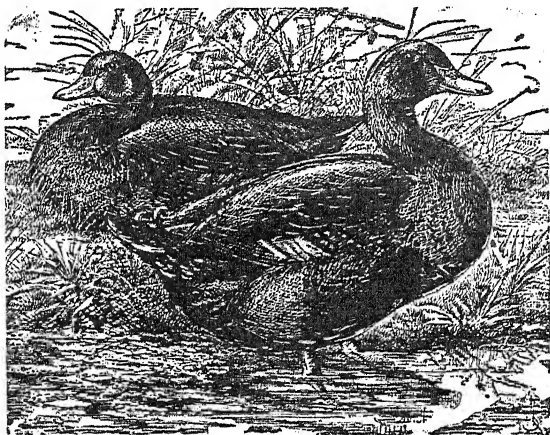
other breeds. It is a fair layer, almost similar in size to the Aylesbury, but not possessing the quality of flesh.

The head and back of a Rouen drake are rich sheeny green: there should be a white ring around the neck; the breast should be claret colour; the legs dark orange, and the bill a greenish yellow; the lower part of the body should

be a beautiful grey, the wings should have a blue and white bar across them.

The duck is different to the drake in colour, but is equally handsome. The illustration will give a good idea of the plumage of these birds. The Rouen will fetch as much money as the Aylesbury, some exhibition specimens have fetched £10 to £15 each.

The Cayuga—The Cayuga duck is supposed to be an American breed. Some people believe it originated from a cross between the Rouen, Aylesbury and Indian black duck. However it originated, it cannot be denied that it is a very fine duck indeed. It is black throughout with a lustrous green shade on the head, back, neck and wings. The head should be large and round, bill wide and flat and of a sooty colour, the legs and feet strong and sooty in colour.



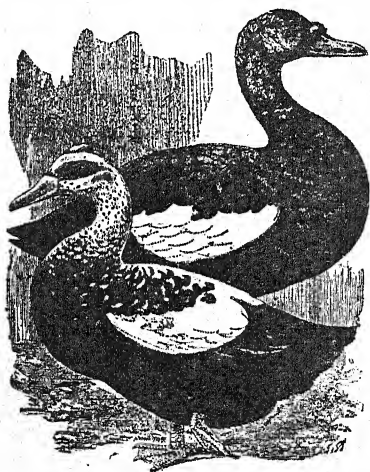
THE CAYUGA.

The Cayuga is a good layer and a table bird, the flesh being very sweet. It is almost the size of Aylesbury. It will fetch as much money as the Pekin.

The breed is popular in England but there are not many in India. The birds obtainable in England are said to be better and larger than those that are to be had in America.

The Muscovy—The Muscovy is supposed to be a South American bird, but is very common in India and is too well known to need any minute description. They are large birds, the drake being very much larger than the duck and weighs from 7 to 9 pounds, while the duck weighs from 4 to 5 pounds. The Muscovy is a fairly good layer and a good table bird. It is easily reared and very hardy when mature, but will not thrive in confinement.

The Muscovy is found in all colours—pure black, white, white and black, white and brown or grey. The pure white



THE MUSCOVY.

are the nicest of the lot. This bird can be procured in nearly all parts of India. There is one thing against this breed, the drake is very quarrelsome and will make it very unpleasant for the other in mates of the poultry yard. If kept separate, they do very well.

The Indian Runner—The Indian Runner is supposed to be of Indian origin, a statement, the truth of which I very much doubt. I believe it has been originated from a cross between the Pekin drake and the common Indian duck.

The Indian Runner is smaller than either the Aylesbury or Pekin, and has a long round body, a long neck, and is

tightly feathered and very erect in its carriage. The drake should weigh from 4 to 6 lbs. and the duck about 4 lbs. They are light brown and white or grey, but some are pure white.

Indian Runners are very active in their habits, and have a running (hence the name) rather than a waddling motion. They are excellent foragers, small eaters and marvelous



THE INDIAN RUNNER.

layers. The flesh is of fine quality and flavour, but they do not fatten well. They are hardy and easy to rear and may be used with great advantage for crossing with the heavier breeds to improve their laying qualities.

Orpington Ducks—There are two colours of this variety, the buff and the blue. They are very handsome and most useful birds. They are very hardy, easy to rear, quick in growth, and fairly active. These birds were produced by the late Mr. William Cook, of Orpington, England, by crossing together the Aylesbury, Indian Runner, Rouen and Cayugas and also the Pekin. These crosses produced two colours, that were fixed by inbreeding, and now the varieties breed true to type. The Orpingtons are in size and shape between the Aylesbury and Pekin, but better as layers. They are great foragers and do well with only a small tub of water to bathe in. A few specimens of this breed have been

brought to India. They deserve wider attention. In England they fetch the same prices as Aylesburys and Pekins.

Khaki Campbells—This is a breed that will fill the bill as a good dual-purpose water fowl. I mean by dual-purpose a capital layer and a good table duck. This breed was originated by Mrs. Campbell, of Uley, Gloucestershire, with the sole purpose of finding a real, useful, all-round duck, and this the lady undoubtedly succeeded in doing. This breed has made great headway and has certainly supplied a long felt want, in the shape of an ideal duck for all purposes under all conditions. They are very active, great foragers, and if given their liberty will find a good share of their daily food. They are easy to rear. The drakes easily—if properly fed of course—attain between five and six pounds at from 10 to 12 weeks old, and the ducks possess superior laying power, producing a good sized average egg, white in colour. A flock average of from 190 to 200 and over a year can be attained. I can with every confidence strongly recommend the "Khaki Campbell" especially where free range is available.

Cross-Breeds—I have described the eight best breeds of ducks to be found in any part of the world. No better birds could be wished for than these in their pure state. The pure bred birds always give the best results, and I would advise all persons to jealously keep the breeds pure. But there are some people in this world who are never satisfied with what there is and are always trying to make something new. For the benefit of these people I will here state what crosses produce the best results.

1. The Rouen drake and the Aylesbury or Pekin duck produce large strong birds and good layers. The colour of the cross-breeds will be a mixture—some will be a little like the Rouen but most of them will be very mixed. But the colour will not affect the laying or table qualities of the birds.

2. The Pekin drake and the Aylesbury duck and the Aylesbury drake and Pekin duck will produce large good table birds and very good layers. Some of the cross-breeds

will be like the Aylesbury and some like the Pekin. This is the best cross.

3. The Muscovy drake and the Aylesbury or Pekin duck will produce good large birds for the table. These cross-breds will be mules and not breed.

4. The Pekin drake and the Indian Runner duck, or the common Indian duck will produce birds very much larger and better than the common ducks.

5. The Indian Runner drake and the common Indian duck will produce very fine layers and good table birds.

In order to improve the common country duck, the following plan should be adopted. Put a good strong Indian Runner drake with four large sized common Indian ducks. Take four large females of this cross and put them with a medium-sized Aylesbury or Pekin drake. The result of these crosses will be large, well-formed, hardy ducks which will make excellent table birds and layers.

Another plan to improve the Indian duck is to place sixteen large country ducks with four Pekin drakes and take sixteen ducks of this cross and mate them again to their fathers. This will produce large birds. The ducks of the second cross may be put with Aylesbury drakes. The Rouen and Aylesbury drakes are too large and heavy to mate with the small country ducks.

One thing must always be borne in mind when crossing different breeds and that is to separate the drake from all the ducks of his own breed, and put him with only ducks of the other breed. If ducks of his own breed are allowed to remain with him he will not pay any attention to the other ducks, and their eggs will be infertile.

Ducks bred for Meat—The most important meat ducks include the Pekin, Muscovy, Black Cayuga, Rouen and Aylesbury.

Ducks bred for their eggs—The Indian Runner, Khaki Campbell, and the Buff and the Blue Orpington are the most important egg layers.

CHAPTER IV

SELECTION OF BREEDING STOCK

No deformed, stunted or sickly bird should be bred from. Select only such birds as have properly matured and are in perfect health and vigour. If the desire is to breed first class pure bred birds, then only such birds should be selected for breeding-stock as are thoroughbred and are of the right shape, size and colour of the breed. Any mistake made in the commencement will be perpetuated in the progeny. Inbreeding must be carefully avoided, and the male birds changed every two years.

Ducks begin to lay when between six and eight months old, but I would not breed from birds under twelve months old. Good vigorous birds are fit to breed from until they are four years old. Ducks in the second year make the best breeders.

There should be one drake for every four ducks. If more ducks are allowed to a drake, the eggs will not prove very fertile and if a less number is given, the drake will worry the ducks and cause them great injury and the eggs will not hatch well. It is very advantageous to keep the breeds separate and not keep more than two drakes and eight ducks in one breeding-pen. If different breeds are kept together, they will not be happy. The different breeds have different characteristics which are irritating to one another. For instance, the Muscovy is very quarrelsome and will worry all other ducks in the yard. The Indian Runner is a very active and restless bird and will irritate the larger and heavier breeds. When the drakes of one breed are placed with the ducks of another, they will do no harm, they soon make friends and settle down to their routine in life.

Ducks love quietness and must always be treated with gentleness and great care. They must never be driven hard

or chased about. If they are frightened or made to run fast, the probability is that they will receive some serious internal injury, which will either kill them or else utterly unfit them for breeding. When a duck is to be caught, it should be gently driven into its house and caught there.

Birds for breeding should be mated together as early as possible after they have gotten over their moult. The drake can be distinguished from the ducks by the curly feather in his tail. In Muscovy drakes, however, this curly feather is absent from the tail. It is possible to distinguish the drake from the ducks before the feathers are grown by the difference in the voices of the sexes. The voice of the duck is very full and it quacks in such a way that every one can hear it. The drake has a thin, squeaking and almost inaudible voice.

The secret of successful breeding is rigid selection and breeding from only the best. Out of a flock of one hundred ducklings, probably twenty-five will be very defective and fit only to be killed and used for the table as soon as possible. Out of the remaining seventy-five, only ten will be selected as approaching to anything like perfection and will be reserved for the breeding-pen. The remaining ones may be divided into three classes, twenty good breeders, twenty ordinary breeders, and twenty-five fit only for crossing with country ducks or to be roasted for the table. The price of a duck, as the price of everything else, is according to its quality. I have been careful to try and make this point clear, so that the reader in buying or selling ducks may be able to act intelligently and not make a mistake. A famous breeder of ducks in England says: "Where there is a flock of well-bred young ducklings, there are usually some, when they get to be about six weeks old, which stand out from the others. That is to say, they are almost half as big again, and are developing a beak perhaps half-an-inch longer than others of the same age. To all appearances they look as though they were going to have an

immense frame. These should always be picked out as soon as they begin to show signs that they will develop into large birds. They should be put in a nice roomy place by themselves and fed on good nutritious food. Very often people who go in for showing ducks, go around looking at flocks of young ones and pick one or two out of one flock, and one or two out of another. I have known them to give as much as thirty shillings each for them. These are the ducks which usually find their way into the show pens. I wish my readers to understand that, however large and good a pen of ducks may be, they will not throw all the offspring as good as themselves; there will be sure to be a few among them much smaller than the parents, though some of them may surpass the old birds both in size and quality.

"There are also freaks of nature in ducks, just the same as there are in many other varieties of the feathered tribes. What I mean by that is, that the feathers in the wings will often turn the wrong way, instead of being close to the body they will often turn outwards. This, of course, looks very bad. When they come like this, they should never be bred from. Occasionally some of them will come with a little bunch of feathers on the top of their heads. If these are bred from again the little top knots increase in size. I have seen a whole family of Aylesburies with quite a crest of feathers upon their heads. The feathers have been about two inches long, like those on a Houdan hen's head. I do not like to see them, as it looks unnatural in a duck. Of course there are people who fancy such ducks, and it is very easy to make a strain of stock ducks of this kind when a person who has a fancy for them has one or two sports come with feathers upon their heads."

CHAPTER V

EGGS

In India ducks commence to lay during the rains and keep on with breaks of short intervals right through until April. All breeds do not lay alike, some will not lay more than 60 eggs in a year, while others will lay 200 eggs in the same time. A duck's egg should weigh from two-and-a-half to three ounces. Duck's eggs vary in colour from white to pink and green. The same duck will lay eggs of different colours. This is true of all breeds; every egg a duck lays will not be of the same size. It is no use setting eggs under two-and-a-half ounces in weight, or those very much above three ounces.

Ducks lay their eggs at night and in the morning up to about 10 a. m. They have a bad habit of dropping their eggs anywhere on the ground or in the water, and if not carefully watched many eggs will be lost. There should be generally, when in full lay, an egg from every bird, failing which the ducks may be confined a little longer. Irregularity in laying is a tolerably sure sign of a duck being out of health or condition. Plenty of comfortable nests of clean, dry straw or grass will do much to persuade them to lay in the proper places. Unless care is taken, crows will carry away eggs from the duck's house and yard. For this reason it is very advisable to have a covered yard or run for ducks. Ducks should be confined to their yard until 10 a. m. When they will have laid all the eggs they will that day. When ducks are overfed and become too fat, they cease to lay and become diseased.

Sound eggs from pure bred first class stock can be sold for from six to twelve rupees a dozen. Common duck's eggs fetch nine annasa dozen.

Demand for Duck Eggs—There is a good demand for

duck eggs. They are valuable for baking. Some cafes in the U. S. A. use more duck eggs than hen eggs because they are larger. The demand in India is sure to develop as people use them more. The world is demanding more and better things, and just as soon as the average person finds out that duck eggs are really better for some purposes they will demand them. Poached or fried duck's eggs are delicious.

CHAPTER VI

FOOD FOR STOCK DUCKS AND DUCKLINGS

Ducks eat insects, snails, frogs and fish. They also feed on grains, grasses and other kinds of plant life. The feeding of ducks is not at all a difficult matter. Ducks, as a rule, are gross and voracious feeders and will eat anything they can pick up. The food a duck eats very materially affects the flavour and quality of its flesh and eggs, and also the vitality of the ducklings produced from the eggs.

It is very necessary to allow them only such food as will keep them in perfect health and good condition, and will enable them to produce good meat for the table and strong healthy ducklings.

The best food for ducks is wheat-bran, rice-meal (*goora*), ground barley and scraps of meat and vegetables. Cooked turnips and carrots fed in the moist mash are good.

MOIST MASH

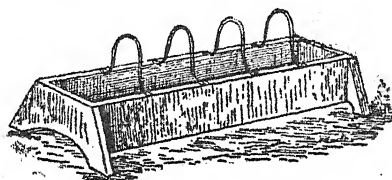
Wheat-bran.....	3 lbs.
Rice meal (<i>goora</i>).....	1½ lbs.
Ground barley.....	1½ lbs.
Cooked meat.....	3 lbs.
Boiled vegetables.....	3 lbs.

This amount will be sufficient for 24 large ducks for one meal if kept confined.

The whole should be properly mixed together with water until moist and crumbly and then put out in feeding-troughs before the ducks. Sharp flint grit is very essential to the health of the duck. The grit must be sharp and should be mixed with the duck's food. A handful will be sufficient for eight or ten ducks. The pieces of grit should not be larger than one-fourth of an inch in diameter.

The above quantities of food are sufficient for one meal

for 24 large ducks confined to their yard. When ducks are confined to a yard they need more food than they would if they were allowed to go in the tank and field and pick up much of their food there. If the ducks are allowed their liberty and pick up part of their food from the tank and grounds around, then the above-mentioned quantities of food will be sufficient for two feeds, half in the morning and half in the evening. Small ducks will not need as much food as the large ones will.



FEEDING-TROUGH.

Ducks in confinement should be fed three times a day, and at each meal only as much as they will eat up at once, should be given. No food should be allowed to remain in the trough. After the birds have been fed, the troughs should be properly cleaned and clean water put in them for the ducks to drink.

When ducks are not laying they do not need as much food as when they are laying.

When kept confined to the yard, ducks require some meat or snails or small fish in addition to the regular supply of food, unless some animal food is provided, they will not thrive.

Ducks should never be fed on paddy or rice alone. Wheat-bran and rice-meal with barley added are the right and proper ingredients for duck's food. Rice-meal or *goora* is the inner red skin on the rice under the husk. When the rice is husked this skin remains on it and is removed by a process of pounding. It is this mealy stuff, which the Indians call *gora* or *koora*, that is most excellent for ducks when

given mixed with wheat-bran. The outer husk of the paddy is useless.

Green food is very necessary for ducks. When they are kept in confinement, cabbage, turnips, carrots, onions, and all refuse vegetables from the kitchen garden should be chopped up and added to the regular food.

Preparation Of Moist Mash—The meat (offal from slaughter house is the cheapest), vegetables such as turnips, carrots, pumpkins, etc., should be cooked in as little water as possible. When cold, run meat through mincing machine or chop it up fine. Mash the vegetables. Add the bran, rice-meal and ground barley and mix thoroughly. Use only enough of the water the meat and vegetables were cooked in, to make a moist crumbly mash. Feed in shallow troughs or dishes. Give as much as they will eat quickly. Do not allow any food to lie about in the yard. Clean water should be placed in the water vessels three times a day.

Feeding Breeding Ducks—Two methods may be used in feeding breeding ducks. Either feed a wet mash in the morning and in the afternoon and also a mixture of grains in addition, or the mash may be fed dry in feed hoppers. This saves labour and is said to give just as good results as feeding wet mash. Grain is also fed in addition. The feed hoppers are kept open not more than an hour in the morning and 2 hours in the late afternoon.

A good mash has the following per ton of feed:

Ground maize.....	425 lbs.
Wheat bran.....	300 lbs.
Wheat atta	200 lbs.
Ground barley meal	
or ground bejhar.....	300 lbs.
Ground oats.....	150 lbs.
Soybean oil meal.....	150 lbs.
Fish meal.....	75 lbs.
Alfalfa meal.....	120 lbs.



Dried skim milk or	
dried buttermilk.....	150 lbs.
Pulverized limestone...	70 lbs.
Salt.....	10 lbs.

The mash should have about 18% total protein; alfalfa meal may be omitted if plenty of green food is available.

Feeding Ducklings—Use mash for the first six weeks. Either one of the two methods used in feeding breeding ducks may be used in feeding ducklings.

The wet mash is fed 4 or 5 times a day during the first week and then 3 or 4 times daily. Any feed left should be removed after each feeding. No grain is fed but chopped green food or cooked vegetables should be given.

A good mash for the first 6 weeks is as follows :

Ground maize.....	690 lbs.
Wheat bran.....	300 lbs.
Wheat atta.....	300 lbs.
Ground barley meal or	
ground bejhar.....	300 lbs.
Soybean oil meal.....	150 lbs.
Fish meal.....	100 lbs.
Alfalfa meal	120 lbs.
Dried skim milk or	
dried buttermilk.....	100 lbs.
Pulverized limestone.....	30 lbs.
Salt.....	10 lbs.

The protein content of the mash for the first 6 weeks should be about 18%. Fresh drinking water should be supplied at each feeding. Grit or sand should always be available.

If the dry mash feeding is used, the duckling should have access to the feed hopper at all times and to water. No grain is fed. When old enough for fattening, they should be put on a fattening mash, preferably moist mash.

CHAPTER VII

HATCHING AND REARING

Hatching—Ducklings can be raised all through the year. The eggs may be set under hens or ducks or placed in an incubator. Hens make the best hatchers and mothers for ducklings. My greatest success has been with hens. Only six eggs should be placed under a large hen. The Game and Chittagong hens make the best mothers for ducklings. Set two or three hens at the same time and when the ducklings are out, give each hen from six to eight.

The best way to set duck's eggs is as follows:—Procure an earthen *gumlah* about 14 or 15 inches in diameter, and 9 inches deep. Put five inches of sifted, clean, dry earth in the *gumlah*, press down the earth with the hand and hollow out the centre. Place about an inch of dry cowdung-ashes over the earth, press down the ashes into the shape of a saucer. Sprinkle a good handful of flower of sulphur over the ashes, and then break up a small quantity of soft, clean, dry hay and place it over the ashes and sulphur. Press down the hay and sprinkle some insect powder over it. Place the eggs on this nest and then place a properly clucked hen on the eggs. Keep the sitting hen in a quiet room where she will not be disturbed by anything. Place some grain and water a few feet from her so that she can get to it whenever she is inclined for it.

Sprinkle the eggs in the nest with lukewarm water once a week for the first two weeks, and twice the third week and every other day until they pip the fourth week. The eggs should be tested on the fourteenth day and not before. Take an egg up in your hand, hold it up against a bright light or the sun, close one of your eyes and look through the egg with the other eye. If the egg is clear like a new-laid egg, then it is

infertile or addled, but if it is dark looking, it is in all probability a sound egg.

Nearly all duck's eggs will take 28 days to hatch. They are chipped usually on the 27th day. Muscovy duck's eggs take 35 days to hatch. They generally chip a day or two before that.

When a duck is allowed to sit on eggs, the nest should be made in the same way as mentioned above, only it should be on the ground in a corner of the room and not in a *gumlah*. The sitting duck should be allowed out every day and regularly supplied with food and water.

The eggs will chip on the 27th day. If all goes well, the ducklings will be out on the 28th day. If it is found that some of the eggs are not chipped on the 28th day, then take a pen knife and make a small hole on the large end of the egg. Make a *small* hole and hold the egg up to the light and see where the beak of the duckling is. Just above the beak make an opening about the size of a two-anna-piece, and replace the egg under the hen. *Great care must be taken not to draw blood.* The eggs should be carefully watched and examined every few hours and all the addled ones and those with dead ducklings should be removed and those with live ones left under the hen.

After the eggs are chipped it takes the ducklings from 12 to 36 hours to absorb the remaining yolk for their support immediately after hatching. If it is found that the duckling is unable to break the shell of the egg, a little assistance will be necessary. A small portion of the shell around the chipped part must be gradually removed, and the lining membrane under the shell moistened with a little warm water. *As long as there is any blood around the duckling it must not be taken out of the shell*, but as soon as all the yolk and blood are absorbed, the top portion of the shell and inner membrane must be removed and the duckling released and placed under the hen or in the incubator. It needs some experience and

great care to perform this operation. The slightest mistake will injure the little thing.

When replacing the eggs under the hen or in the incubator, great care should be taken to place the eggs so that the chipped portion will be turned upwards.

Rearing—After they are out of the shells, the ducklings should be allowed to remain under the hen or in the incubator for 24 hours before they are fed. During this time they will become quite dry and strong. It does positive injury to feed ducklings very soon after they are hatched. Twenty-four hours after they are hatched they should be placed in a clean, dry box or basket and fed. The mother must be fed apart from the young ones. Give her a good feed and plenty of water.

If ducklings are hatched in an incubator give them to a hen to rear. Ducklings do not thrive in foster-mothers as chickens do.

Ducklings are very stupid little creatures and do not know how to eat the food placed before them, so it is necessary to teach them how to eat. Take equal parts of oatmeal and rice flour, and enough turmeric to give colour, mix with a little milk until quite sloppy, take a clean stiff feather, dip the tip of this feather into this mixture and lift a small portion of it on the feather and hold the feather to the mouth of the duckling. The little creature will peck at it and soon get some into its mouth. At first it will shake its head and throw out all it gets into its mouth, but in a little while it will learn to swallow. This operation has to be repeated every hour for the first two days. Also place a small shallow vessel, about half an inch deep, near the ducklings, with some clean water in it. Sprinkle a little oatmeal over the water. The ducklings will drink the water and pick up the oatmeal.

The ducklings should be placed out on the dry grass with their mother under a small covered run. They are very troublesome the first few days after they are hatched, and it takes a great deal of patience to feed them. After the

fourth or fifth day they give very little bother, for them they are able to eat properly.

For the first week they should be fed on oatmeal, ground rice and milk, with a little turmeric added. The food should be renewed every hour in small quantities. In the second week they should be fed on equal parts of the ground wheat, ground barley, ground oats, and ground rice, with some finely chopped meat, all mixed together with milk or hot water, and occasionally a little cooked rice should be given. Cooked rice should be given very sparingly as it causes cramps in ducklings. It would be very much better if the ground wheat, barley, oats, rice and chopped meat could be cooked together and given to them.

In the third week and to the end of the sixth week they should be fed on ground wheat, barley, oats, and rice mixed with hot water an hour before it is given, and chopped meat and snails. These snails are found in the beds of tanks. They should be washed and broken up between two stones before they are given. The large pieces of meat in the shell should be cut small.

After the sixth week the diet should be equal parts of wheat-bran, rice and barley-meal or ground paddy mixed with warm water, also meal and vegetables, chopped and cooked, and snails. Sharp flint grit must be given to the ducklings in their food. The grit should be at first sifted through a medium flour sieve, and what is passed through the sieve must be mixed with the food. A tablespoonful will be enough for sixteen ducklings a week old, as the birds grow larger, more and larger pieces must be supplied.

During the first week ducklings must be fed every hour. During the second and third week, every two hours. From the third to the sixth week, every three hours, and thereafter until the tenth week only four times a day. The feeding should be done at regular hours and only as much given at each time as the birds will eat up at once. No food should be allowed to remain with the ducklings. The greatest care

must be taken to prevent over feeding. If young ducklings are allowed to eat too much they are sure to suffer from indigestion and there will be serious trouble.

A little flower of sulphur should be put in the food once a week. This will help the birds to feather properly.

A vessel with drinking water should be kept constantly near the ducklings. The drinking troughs or fountains must be deep enough to permit the ducklings to cover their heads or at least their bills, otherwise their nostrils will get stopped up with shoveling in the mud owing to the want of sufficient water to wash them. This will cause difficulty of breathing, showing itself in loss of control of their legs, which, if not attended to, often results in sudden death without apparent cause. The habit ducks have of throwing the water about with their heads and bills is induced by their endeavours to wash their nostrils. The drinking vessels should be about two inches deep, so that they can drink freely without getting wet themselves, or a pot or vessel of any kind may be sunk level with the ground, covered with a board with holes in it, large enough for the ducks to put their heads through to fish out wheat and paddy scattered in the water.

The drinking water should never be allowed to run short.

Notwithstanding the saying that "Wet weather is good for ducks," it is the worst thing for ducklings. Newly-hatched ducklings are, in a sense, almost nude, as their down is not much protection against wet, and they are, for the first few weeks, nearly as susceptible to cold and wet as chickens. After that time, however, they can bear far more of either.

Although water seems their natural element, and apparently adds greatly to their happiness, experience proves that ducklings grow quicker and thrive better with only sufficient water to drink. When they are allowed bathing water, the heat absorbed by the cold water weakens the ducklings and retards their growth, and frequently causes cramps and cholera. I wish to impress this fact upon the

minds of all people wishing to raise ducks, for most people make a mistake at this point and lose large numbers of young ducks.

Ducklings can stand wet and damp no better than chickens can. They should be kept in a large box or coop with a wooden bottom. On no account should they be allowed to remain on wet damp ground. A large box with half-inch mesh wire-netting front will make a splendid coop for the young ducks. A coop three feet long, two feet wide, and twenty inches high, will be large enough for a hen and her brood of ducklings. On dry days ducklings should be placed out on the grass.

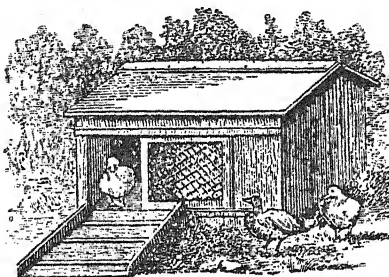
As the ducklings grow large, they will need more food and more exercise. For the first three weeks a run six feet long, three feet wide, and twenty inches high, will be sufficient for a hen and six or eight ducklings. After the third week a run 12 feet x 6 feet should be provided. It will do the young ducks good if they are allowed to run about for a couple of hours every day in the garden. The run should be moved to new and clean ground every day. Overcrowding must be avoided and not more than from six to eight ducklings kept together. If more are kept in one place they will be greatly injured.

Ducklings cannot stand the heat of the sun; a large number of ducklings are killed by sunstroke. They should have plenty of sunlight, but none of the sun's rays. Their coops and runs must be placed under large shady trees, or else covered over with planks or mats. After the ducklings are ten weeks old they will have gotten most of their feathers, and can be let out into the yard and tank and given perfect liberty. They should be fed three times a day until they are six months old. The more they run about and eat, the larger and quicker they will grow.

Green food, also animal food, is very necessary for ducklings; chopped cabbage, onions, and all refuse vegetables should be chopped up and cooked and mixed with their food

or given separately. When vegetables are not obtainable, soft *doob* grass must be cut up into small pieces and mixed with their food.

With proper care and attention it is very easy to rear ducks successfully.



HOUSE FOR YOUNG DUCKS OR GEES.

Cleanliness—In order to prevent the ducklings from getting sick, perfect cleanliness must be observed, and their coops, runs, and water and food vessels kept perfectly clean and sweet. The water given to them must be quite clean, and their food stuff must be pure and sweet. It is no economy to feed ducks on rotten and bad grain or vegetable.

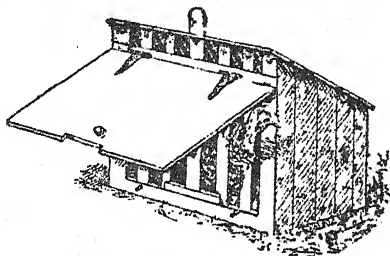
Fish Meal—If available fish meal added to the mash is very good for ducklings and breeding ducks. Up to 10% of the total weight of the mash may be used.

Use *either* fish meal or cooked meat (offal), don't use both.

CHAPTER VIII

FATTENING DUCKS

Ducks will usually eat so as to cram themselves if they can only get at food. The best way to do is to keep the ducks and drakes separate in different coops. A coop for six ducks should be six feet long, eighteen inches wide and eighteen or twenty inches high. The coop should be made like the following illustration.



COOP FOR FATTENING DUCKS, GEESE, AND TURKEYS.

When a duck is once placed in a fattening coop, it should never be let out again until the day it is required for the table.

Very young and old ducks will not fatten well. Ducks between four and six months old are the best to select for the fattening coop. The birds so selected should be in perfect health.

If properly fed a duck will become fat and fit for the table in fifteen days from the time it is placed in the coop. Very often when ducks are kept longer in the fattening coop, they become sick and suddenly die, or else begin to get thin again. As soon as a duck is ready for killing, it should be taken out of the fattening coop and put in a tank, or in a small yard and a large vessel of water should be given to it to bathe in. When this is done, the duck will clean itself, and get rid of

the offensive fishy smell that adheres to them when kept away from water.

The best food for fattening ducks is the following mixture:—Wheat=bran, Indian corn=meal, boiled rice, pea=meal and rice=meal, in equal parts, with some vegetable, and scraps of meat and fat added. The ducks should be fed three times a day and only as much given each time as the birds will eat up in ten minutes. Let them eat all they possibly can, but never allow any food to remain in the food dish. Make the food moist and give a little drinking water after they have eaten, but do not allow any water to remain in the coop.

Indian corn, peas and rice are very fattening. The grain should always be ground and mixed with hot water or else cooked. Dry food or whole grain should never be given. More than six ducks should not be put in one coop, and the males and females should never be put together.

CHAPTER IX

DISEASES OF DUCKS

Ducks are not so subject to diseases as fowls. If they are properly kept diseases will very seldom be seen in a flock of ducks. But when one does get ill, it is very difficult to cure it, very few of their diseases are curable.

1. *Liver Disease*—Rather common complaint in ducks. The duck eats well, but gets very thin and goes lame in one leg. No cure. Kill off at once.

2. *Consumption*—The duck will not eat soft food, but will eat Indian corn ravenously, at the same time it will become light in weight. It will cough and will have a slight cold. No cure. Kill at once.

3. *Indigestion*—Bird healthy in all respects, but will not eat. Give two drachms of salad oil, or a teaspoonful of Epsom salts, and a teaspoonful of poultry powder.

4. *Cramp*—The duck is unable to walk, but otherwise healthy. Keep it separate from other ducks, in a cool and shady place, feed properly and keep dry and clean. Rub the legs with Elliman's embrocation. Give a teaspoonful of Epsom salts.

5. *Egg-Bound*—Apply a little sweet oil with a feather to the oviduct. The oil should be applied so that it will go in. Give a couple of teaspoonfuls of Epsom salts in warm water. If in the attempt to pass the egg the oviduct comes down, the duck should be killed.

6. *Roup*—Ducks sometimes get roup. The only symptom visible is a little foam and matter around the eyes, the eyes look as if they were dirty. The disease will attack every bird in the pen if care is not taken. Young ducks are usually attacked. Bathe the eyes with permanganate of potash and alum water, and give the birds a teaspoonful of

poultry powder every day. Keep separate and feed on soft nourishing food.

7. *Staggers*—Young ducklings frequently suffer from giddiness and fall on their backs and are unable to get up. This is caused by sunstroke or being kept in a crowded and confined place. Pour cold water on the bird's head and keep in a cool quiet place. Recovery is rare.

8. *Swelling up*—Young ducklings sometimes get air between the flesh and skin. This is caused by over-crowding and bad air. Take a sharp pen-knife and prick the skin and press out the air. Keep the bird in a clean cool place.

9. *Weakness of the Loins*—Young ducklings are very subject to this disease. It is caused by bad feeding and want of exercise. Keep them separate from the other birds, and feed properly, and apply Elliman's embrocation. When young birds are frightened or driven about they often become injured and get sick in this way.

10. *Crowding*—Guard carefully against this. They need free ventilation.

CHAPTER X

KEEPING GEESE

About 40 different kinds of geese live in different parts of the world. Geese have long lives, sometimes reaching the age of sixty-five in captivity. Domestic geese are descended from the graylag goose of Europe.

They are some of the proudest birds in the animal kingdom. Ornamental varieties are the Sebastopol and Gambian geese.

Wherever there is a large field or some waste land over which they can run, geese can be easily kept. Green grass forms the greater part of their food and unless they have good grass lands they will never thrive. Water also is very necessary to their well-being, and unless they have a tank or a large pond in which to swim, they will not be happy and their eggs will not prove fertile.

They are very hardy and very seldom become sick. If kept properly geese will live to a great age and be very prolific. If geese had to be supplied with all the food they eat, they would not be nearly as profitable as ducks, but they pick up a large portion of their food when allowed to do so, and are quite profitable to keep.

There are several varieties of geese. Of all varieties the best are the Toulouse, the Embden, and the African geese. The China, or more correctly speaking, the Indian goose, is not equal to either of the three varieties mentioned above. The Indian goose is a great wanderer and exceedingly noisy and a nuisance when kept close to a dwelling-house. The Embden and Toulouse are very much better in these respects.

House and yard—The goose-house should be built in the same way as the duck-house described in Chapter II. The house should be at some distance from any dwelling-house

as the noise the geese make is very unpleasant to people. Geese will not endure crowding together, their house must be airy and perfectly ventilated. A house at least 12 feet by 9 feet will do for only twelve geese. The floor should be as in the duck's house, properly littered with sand and straw. It does not matter if the house is at a little distance from the tank, geese will walk a long distance in search of water.

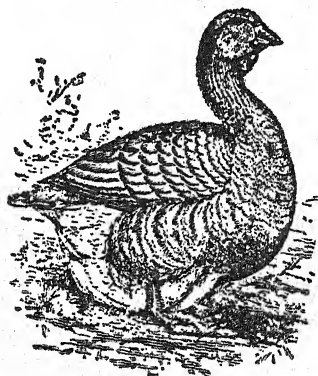
A yard is unnecessary for geese. They will not thrive in confinement. If they are enclosed in a yard, the enclosure must be a very large one. Every four geese will need at least an acre of land. There should be a pond on the land.

Cleanliness in the house and yard is an absolute necessity. Geese soil their house and yard very much. The house and yard should be treated the same way as recommended for the duck-house. Fowls, ducks, or Turkeys must not be kept in the same house with geese.

CHAPTER XI

THE DIFFERENT BREEDS OF GEESE

1. *The Toulouse*.—This goose is noted for its size and good table qualities. It grows to a great size, and a pair will weigh from forty to sixty-five pounds. It is also a very fair layer; an ordinary bird gives twenty-five or thirty eggs a year. The Toulouse does not mature very fast and is not easily fattened. It is of a nice grey colour, with orange legs and beak. It has short legs and a very large deep body. The Toulouse is not very noisy and does not wander far from home.

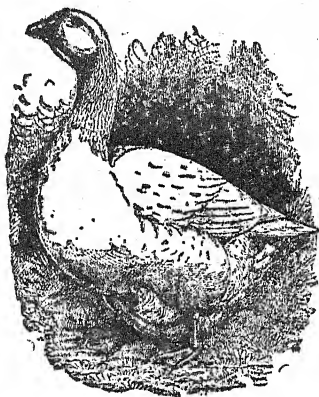


TOULOUSE GANDER.

2. *The Embden*.—The Embden matures more rapidly and lays on flesh earlier than the Toulouse does. It grows to as great a size. A pair should weigh from forty to sixty pounds. Its plumage is pure white, its legs a dark orange and bill pinkish yellow. It has short legs and large deep body. The Embden is a very good layer; some birds have laid as many as eighty eggs in the year.

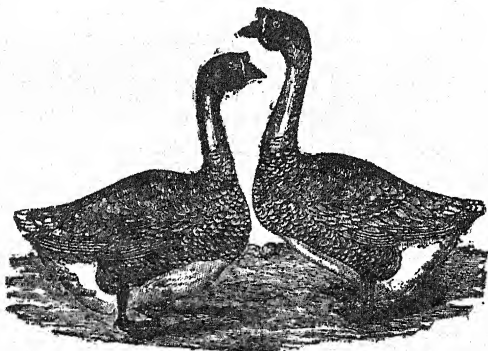
3. *The African Goose*.—The African goose is somewhat

like the Indian goose in shape and form, but is considerably larger, having a larger head with a large knob upon the base



EMBDEN GANDER.

of the bill. It has a dewlap like the Toulouse, but somewhat larger. It is grey in colour, with white on the neck and underpart of the body.

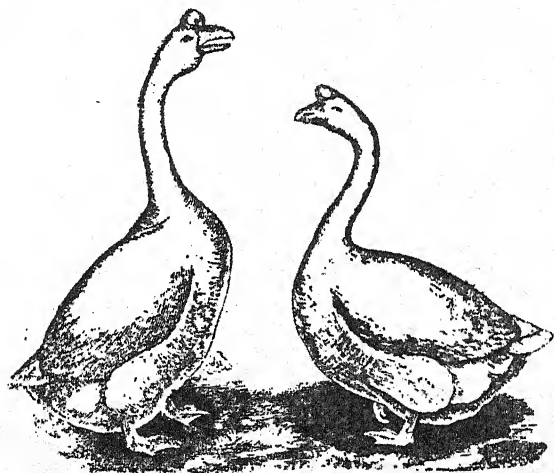


AFRICAN GESE.

It is very hardy and a prolific layer of large eggs. These birds are very rare in India, but I have seen some very good specimens in the Calcutta Zoological Gardens and a few owned by some rich gentlemen. This bird is very popular in America and is largely bred there.

These birds should be procured from some reliable breeder in America. In India they will do better than the Toulouse or Embden.

4. *The Indian goose*—The Indian goose is, I believe, the same bird they call "Chinese Goose" in England. It is found in all colours and sizes, some are grey, some white, and some grey and white. Their size varies according to the localities



INDIAN GEESSE.

they are bred in. No special care has been taken to improve the breed, but where they have been properly fed and cared for they have grown to a large size. The Indian goose has longer legs, and a longer and thinner neck than either the Toulouse or Embden, but it does not carry as much flesh. It lays from nine to twelve eggs before it desires to sit, and makes a very good sitter and mother. It is a great forager and wanders long distances in search of food and water. Indian geese are very noisy. These birds are cheap in India.

CHAPTER XII

BREEDING AND REARING GESE

Only the largest and best formed birds of good colour and free from defects should be selected for breeding. Good sized birds cannot be bred from small sized stock. The larger a goose is the more in proportion it is worth and it pays better to have first class stock birds, even though they are more expensive than inferior ones. Three geese should be allowed to each gander. In-breeding must be avoided. New blood should be imported every second year.

Geese begin to lay in October and November and, if properly managed, will keep on laying until April and May.

It is best to allow the goose to sit on her own eggs. When the heavier breeds are kept, it will be well to keep a few common Indian geese to hatch and rear goslings. Some people set goose eggs under hens. Large Brahma hens may be used for this purpose, but I prefer the goose or an incubator for hatching and then allow the goose to have the goslings.

The sitting goose must be looked after and fed regularly. It takes thirty days for the eggs to hatch, and if not watched the goose will not leave her nest during this time. If she is not taken off her nest and given food and water she will die of starvation. A dish of water and a dish of food must be placed before the sitting goose every day at 8 or 9 o'clock. If she does not leave her nest she must be gently lifted up and placed near her food. After she has eaten she should be allowed to go out on the grass and to the tank or pond. She may stay away 20 minutes or so and will then return to her nest. This will do both the goose and the eggs good, the goose needs the change and exercise, and the eggs need the fresh air and cooling. The nest should be made on the ground in a corner, in the same way as recommended for nests for ducks. Only as many eggs as a goose can properly cover should be given to her. Some will take only nine eggs and

some twelve. It is better to give too few than too many. The eggs, if all is right, will begin to chip on the 29th day and food and water must be brought to her nest. The hand should be put under her occasionally and all the shells of the hatched eggs gently removed. Care should be taken not to allow the young ones to remain on the ground during the night, for rats will take them away if they get a chance.

The goslings should be allowed to remain quietly under their mother for 24 hours after they have hatched before food is given to them, when the following food should be given—oatmeal, whole wheat flour, ground rice and tender *doob* grass chopped up, in equal parts mixed with milk, and a little ground turmeric added. This food should be given in small quantities about six times a day. Goslings should be fed in the same way as young ducklings. A shallow pan with water should be placed near the birds, so that they may drink and wash their beaks, but not get into it. From the first day they should be placed out on the soft *doob* grass under a small covered run. They should be protected from the sun and rain. Goslings are as susceptible to the sun, wet, and damp as ducklings are and every care should be taken to protect them.

As the birds grow larger they need larger quantities of food. They will thrive on the same quality of food as that given to ducklings, prepared in the same way, but they need a greater quantity of green food. They need a great deal of exercise and should be allowed out with their mother three or four times a day until a month old. When they are a month old they may be allowed out on the grass with the mother for the greater part of the day, and when between two and three months old they should be allowed perfect liberty, and fed only four times a day. If properly fed the goslings will be ready for the table when six months old.

The goose mates for life and the male shows a great interest while the female is on the nest. He will attack any intruder at that time and will protect the goslings when hatched.

CHAPTER XIII

FOOD FOR STOCK GEESE, AND THEIR MANAGEMENT

Food—Stock geese should be liberally and regularly fed but never allowed to grow fat. The best food I have found for them is wheat-bran, ground barley, and paddy with plenty of chopped refuse vegetables. The bird should be fed regularly twice a day, morning and evening, and they should be turned out on grass lands every day from morning until evening. There should be plenty of pure water for them to drink. There should be some nice shady trees on the land on which geese are allowed to run.

Enough grain should be fed to keep the geese in thrifty condition. Maize, barley or sorghum (juar) can be fed. For mash, a duck or hen mash is good. Grit and oyster shell must be supplied.

The goslings may be fed a chick or duckling mash in wet form or they can be started on stale bread soaked in milk or water. Plenty of green food should always be supplied. After 2 or 3 weeks they will not need any mash if they have plenty of grass or other good pasture.

Laying—The goose-house should, be provided with a lot of clean straw for the birds to lay on. Geese generally lay in the morning between 8 and 10 o'clock. If the door of the house is left open, the geese will go in and lay their eggs there. The eggs should be gathered every day and kept in a clean, cool place.

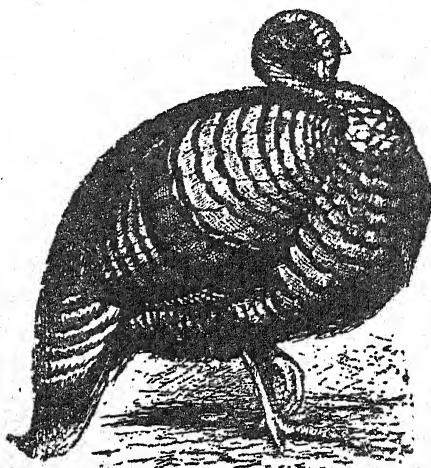
Cross-Breds—The only cross that should be made is to improve the common Indian geese by crossing with a pure bred Embden or Toulouse gander and mating the geese of this cross with pure bred ganders.

Disease—Geese are hardy and subject to few ailments. They suffer in the same way as ducks do and the same remedies may be used.

CHAPTER XIV

TURKEYS

The turkey is a large game bird of North America. It is related to the pheasants. Turkey breeding is an important part of the American poultry industry. The industry is valued at about \$ 50,000,000 a year.



THE BRONZE TURKEY.

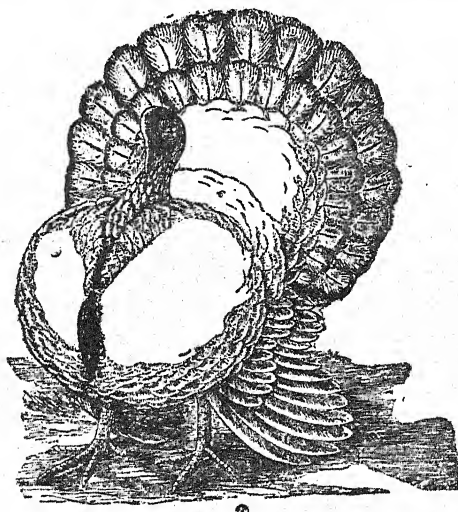
There are six standard varieties of turkeys in America. They are the Bronze, the Narragansett, the White Holland, Bourbon Red, the Black and the Slate. The largest is the Bronze. Adult males or *toms* weigh 36 pounds, hens 16 pounds. The rest are all about the same size. Adult males will weigh about 33 pounds and young hens 14 pounds.

In India there are three varieties of turkeys. They are not natives of India, but have been imported and are now bred very largely by Indians for the market during Christmas week. Besides the three varieties found in India there are a few others, very large handsome birds, but very seldom seen here.

Breed in turkeys is altogether a minor point. From a commercial point of view the great thing that is wanted is size and in purchasing stock it is absolutely necessary to get the largest birds if success is hoped for.

The turkeys ordinarily seen in India are the American or bronze, the Norfolks or black, and the Cambridge or slate. The blacks fatten the quickest, and the greys (slates) are medium-sized but somewhat delicate. There are very few pure bred birds to be found in India. The blacks and slates are usually crossed with the bronze, the progeny of these crosses are some bronze, some slate and some black. It would be a great advantage if the breeds were kept pure and bred for the highest results.

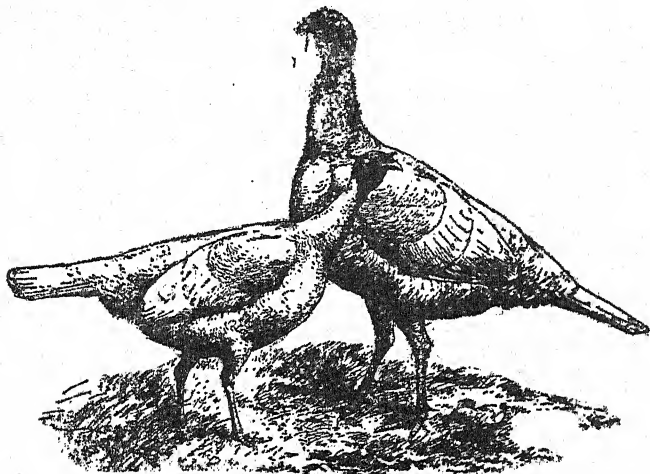
The White Holland turkey is a very beautiful bird. The slate and black may well be crossed with the large bronze



THE CAMBRIDGE GREY TURKEY.

turkey, but nothing is gained by crossing the pure white ones. The White Holland turkey is a large and handsome bird and to cross it is only to destroy its beauty. The turkey reaches maturity when three years old and grows to a great size when

properly cared for. Most of the turkeys you see in India are ill-bred stunted ones, as the Indians have no proper method of breeding and rearing them. To them a turkey is a turkey, be it large or small, and they try to get as much as they can for it, but are not dissatisfied if they get a small price for the bird.



WHITE HOLLAND TURKEYS.

Food.—Breeding turkeys may be fed the same sort of rations as hens. Adult turkeys need food twice a day. In the morning they should be given wheat-bran, ground paddy, and finely chopped boiled vegetables, or in the evening they should have rice meal, ground barley or wheat, and chopped boiled vegetables. They should be allowed perfect liberty all through the day. They will pick up a large quantity of their food in the fields and orchard. There should be a constant supply of pure drinking water for them. The water and food dishes must be kept perfectly clean.

House.—Turkeys cannot be kept profitably in confinement. They are very restless, nervous birds and are happy only when at perfect liberty. If allowed to do so they will roost on large trees at night, but it is best to confine them in a suitable house where they will be secure from thieves and

wild animals. A large shed enclosed with wire netting, with wide perches eighteen inches to six feet from the ground, will provide all the protection necessary for adult birds. In the cold weather they should be protected from the cold north breeze and during the hot months from the hot west winds. This can be done by putting up a mat wall outside the wire netting on the north and west. The floor of the house must be well raised and perfectly dry and well littered with clean straw or ashes. If allowed to roost on the damp ground the birds will become ill. If the door of the house is kept open in the daytime the birds will come home during the hot part of the day and rest in the cool shade. The door of the house should face south. A house built on the same plan as the duck-house will do very well. One thing should always be borne in mind, viz., that no other poultry should be allowed to remain in the turkey's house. If fowls or ducks are kept in the same house they will all become ill and many will die. Turkeys are very fond of wandering about hedges and gardens and fields, they greedily devour all the insects, snails, slugs, etc., they can find and for this reason, they are very valuable in a garden. Though a yard or run is not necessary for turkeys, still care should be taken to provide ample shade on the ground on which they are allowed to run. There should be a large number of trees and shrubs under which they can feed or rest during hot days.

Breeding—Only large, well-formed, healthy and vigorous birds must be selected for breeding. It is best to select the male and female of the same colour. Turkeys do not mature fast. A cock is not fit to breed from until he is three years old and a hen until she is two years old. If allowed to do so they will begin breeding before they are a year old, but it is very advisable to keep the cockerels and pullets separate until the pullets are at least twelve months old and the cockerels two years old. Then they may be mated and the eggs of the first year used for household purposes. The second year the eggs may be set and good strong chickens

produced. The question of relationship is of greater importance in regard to turkeys than it is to fowls. If close relations are bred from, the progeny will be weak and difficult to rear. Either the cocks or the hens in the yard should be changed every year or two. If a three year old cock and four to six two-year old hens are mated together, they may be bred from for three or four years. But if this is done all the young ones from these birds will be closely related and unfit to breed together. If two lots are kept, then the young cocks of one lot can be mated with the young hens of the other lot, and in this way the breeding stock can be kept in full vigour. But it will need two houses and two separate fields or runs for the two lots of turkeys and this is not convenient for everybody to do. The easiest plan is to change the cock bird or the hens every second year. By doing this the young birds of one lot will be fit to mate with the young birds of the next lot, as the relationship will be so distant as not to cause any ill effects. The selection of the breeding stock is of the greatest importance, as your success or failure will greatly depend upon it. The surest way of avoiding close relationship is to purchase the cock from one person, and the hens from another in a different part of the country. Or if you buy two lots, mate the cock of one lot with the hens of the other and vice versa.

It is difficult to say how many hens should be allowed to one cock bird. I believe that not more than six hens should be allowed to one cock. I have bred only two hens with one cock and procured very fine chickens. More than six hens will not prove satisfactory.

Some turkeys are very pugnacious and vindictive, and often ill treat the hens, they will attack children and even grown-up people and will fight to the death with another cock turkey or game cock. It is almost impossible to keep turkeys with other fowls, they will do the others and themselves irreparable injury. Turkeys for breeding purposes should be kept by themselves in another

part of the compound some distance from the rest of the poultry.

Rearing—The turkey hen loves to steal her nest and lay in a quiet secluded place. About the middle of March, generally speaking, the female commences laying. She indicates this coming event by a peculiar cry, by strutting about with an air of self-satisfaction, and often by prying into out-of-the-way places, evidently in quest of a secret spot for incubation. Her instinctive dread of the male is not removed by domestication, nor has the male lost the antipathy to the eggs, which is his characteristic in a state of nature. She should now be closely watched and some management is required to induce her to lay in the nest assigned to her. The nest should be prepared of grass and dried leaves, it should be secluded, and to entice her to adopt it, an egg, or a piece of chalk cut into the form of an egg should be placed in it. When her uneasiness to lay is evident, and symptoms prove that she is ready, she should be confined in the shed or place in which her nest is prepared and let out as soon as the eggs are laid. It is generally in the morning that the turkey hen lays and mostly every other day, though some lay daily until the number of eggs amounts to from fifteen to twenty. As the eggs are laid, it is as well to remove them (leaving a decoy egg or piece of chalk) until the number is complete, as they are liable to be broken or to be sucked by rats. They may then be restored to her for incubation.

The turkey hen is a steady sitter and in this respect resembles the wild bird. Nothing will induce her to leave the nest. Indeed, she often requires to be removed to her food, so overpowering is her instinctive affection. She must be freely supplied with food and water within her reach. Should she lay any eggs after she has commenced incubation, these should be removed. It is proper therefore to mark those which were given to her to sit upon. The hen should on no account be rashly disturbed, no one except the person to whom she is accustomed and from whom she receives her

food should be allowed to go near her and the eggs, unless circumstances imperatively requires it, should not be meddled with. Turkey=eggs can be set under hens. A good plan is to give the first dozen eggs to a couple of hens and allow the turkey to sit on the last lot of eggs and when the chicks hatch, give them all to the turkey. She will take them all and care for them well.

Turkey chicks are very delicate and are unable to endure wet so great care must be taken to place the nest in a perfectly dry cool place.

The eggs will begin to chip on the 27th day and by the 28th day the chicks will leave the eggs. As in the case of young fowls, the turkey chicks do not require food for twenty=four hours after they are hatched. The turkey mother should be fed on wheat-bran and boiled rice and given some water. When she has eaten, put her back on the nest and place the chicks under her. Allow the chicks to remain quiet for about twenty=four hours and then put the turkey and her chicks in a large box or a run, 6 feet \times 3 feet with a wooden bottom and place some food for the chicks before them.

Turkey poults may be fed the same sort of rations as chicks. The first food given to turkey chicks should be eggs boiled hard and finely minced (white and yock), with some whole wheat flour sprinkled over it and some lettuce chopped very small. This should be given for the first day or two and then the following should be given:—ground rice, coarse ground oatmeal, whole wheat flour mixed with milk, hard boiled eggs, chopped onions and lettuce, white ants, curds, boiled rice, and, after the first week, some finely minced meat. The chicks should be fed every two hours for the first week and only a little given at a time. After the first week they should be fed every three hours. The secret of feeding is to give a little and often. If the chicks are allowed to eat too much at a time or remain without food for more than 2 or 3 hours, they are sure to become ill. It is necessary to vary the food a great deal. For the first meal early

in the morning, give hard boiled eggs finely chopped, with some whole wheat flour and ground black pepper sprinkled over it, for the second meal, give finely chopped lettuce and onion tops. For the third meal, give broken dry rice and oatmeal, for the fourth meal, give whole wheat flour mixed with milk and seasoned with a little pepper. For the fifth meal, give white ants, for the sixth meal, give some boiled rice and chopped lettuce, and for the last meal at night, give some finely minced meat and onions. Give only as much at each meal as the birds will eat up at once, and always keep the food and water vessels clean. No food should remain on the ground. Lettuce, onions and white ants or minced meat are very necessary for young turkeys. From the second day, place the mother and chicks out on the soft *doob* grass under a large covered run, 6 feet \times 3 feet. Great care must be taken to see that the ground is perfectly dry and the weather is fine and warm. During fine weather the chicks may be put out on the grass for three hours every morning and evening, but they must be protected from the heat of the midday sun. Young turkeys must never be allowed to get wet. Should a shower threaten they must immediately be put under shelter. On the third day, water should be given in very shallow small vessels so as to guard against the danger of the chicks getting wet and should be renewed three or four times a day.

For the first two weeks the chicks should be kept under the wire-netting run out on clean soft grass. The run should be removed twice a day to new ground. After the 14th day the chicks may be allowed to run about with their mother for a short time both morning and evening, the time may be gradually lengthened until when four weeks or so old, they will have perfect liberty to run over the fields with their mother but must be kept under a covered run during the hottest part of the day and when it is wet.

A quantity of old mortar pounded and some coarse sand should be placed in the run for the chicks. Finely sifted

flint grit should be mixed with the mortar and sand. Douglas' mixture should be added to the drinking water.

Turkey chicks need plenty of fresh air and proper ventilation. If kept confined in a close place they will be sure to become ill.

The mother and chicks must be kept free from lice and the boxes and runs cleaned with kerosene oil and coal tar.

After the chicks are six months old they should be fed only three times a day and allowed to run with the adult birds and stay in their house.

With such treatment the young turkeys will rapidly grow into fine large healthy birds.

Diseases—Turkeys are very hardy when full grown, and yet they are subject to many of the diseases to which fowls are subject and they need the same treatment. *See Poultry-keeping in India.*

Fattening—Turkeys for the table should be separated about six weeks before the time they are wanted. They should be kept in a light, dry, and large room, some straw or clean ashes should be put on the floor, and plenty of sand, lime, ashes and brickdust placed in the corners of the room. The birds should be fed four times a day on as much food as they will eat. Give them clean water to drink. The best food for fattening turkeys is Indian corn meal, barley meal, rice meal, and wheat-bran in equal parts, mixed together with hot water, and finely chopped boiled potatoes, carrots, turnips, cabbage etc., added. Also add some black pepper and a little salt mixed with the rest. Give the birds as much food as they will eat and then remove the food dish. Give water four times a day. Separate the cocks and hens in the fattening coops.

Only young and healthy birds should be selected for fattening. Birds about 12 to 18 months old are the best.

Blackhead—Blackhead is a serious disease affecting turkeys and gains its name from the fact that the head of the affected bird assumes a dark blue appearance. Blackhead is

largely the result of turkeys coming into contact with chickens. Poultry or ducks must never be kept with turkeys. It is a very infectious disease, caused by a small parasite that enters the digestive tract, lodging principally in the intestines and liver. These parasites pass out with the droppings, become disseminated through the soil, and are picked up in the food or water and rapidly infect the whole flock. The first symptom noticed is diarrhoea. The infested bird becomes listless, inactive, and gradually drifts into a stupor. The head becomes dark blue in colour, and the victim soon succumbs. Others become infected, show the same symptoms, respond to no treatment, and another disgusted turkey-raiser goes out of business. Prevention is the only treatment. Attempts to breed immune strains have so far failed. Remembering the fact that the parasites may live in the digestive tract of adult birds for some time, it is well to exercise care when introducing new blood among one's flock. When the disease starts, only the most energetic measures are likely to be of any avail. Disinfect houses, yards, or runs, with a 10 percent solution of formalin, phenyle or carbolic acid. As turkeys are usually given a large run, this makes the problem of disinfection a somewhat difficult one. Isolate the sick birds from the well. Medicinal remedies, such as a teaspoonful of Epsom salts or one-third teaspoonful of potassium permanganate may be added to the drinking water. One-half grain of salol may be given in the moist food. Burn all carcasses of birds that die from this disease. It will prove a good policy to abandon turkey-raising for some years on ground where the disease has made its appearance.

There is no commonly known specific remedy for black-head in turkeys. Strict cleanliness and sanitation is essential if one is to raise turkeys without loss.

Lice—Lice are death to turkeys, especially to turkey poults. Dust the young poults once a week with Keating's Insect Powder. Rub it in well, especially on the top of the head. Most turkey poults are either fed to death or die from lice.

Olive oil on the head is also good. For other treatment see lice in poultry-keeping.

Shooting The Red—Be especially watchful of the poults when at about six weeks of age, they "shoot the red". That is they begin to grow the protuberances on the head and neck. Mix one tablespoonful of red pepper and two tablespoonfuls of wheat ata with water and make into six pills—bake hard. Give one pill three times a day. Follow with a teaspoonful of castor oil for a young poult.

CHAPTER XV

GUINEA-FOWLS

The Guinea-fowl first came from Africa and is a close relative of the pheasant. Because guinea-fowls make such a noise when they are disturbed, farmers value them as "watch-dogs".

It is gregarious in its habits, associating in considerable flocks, which wander about during the day and collect together on the approach of evening. They roost in clusters on the branches of trees or large bushes, ever and anon uttering their harsh grating cry until they settle for the night. The Guinea-fowl does not trust much to its wings as a means of escape from danger. Indeed, it is not without some difficulty that these birds can be forced to take to flight. When they do so, they wing their way only for a short distance, and then alight, trusting for escape to their swiftness of foot. They run with very great celerity, are shy and wary, and seek refuge among the dense underwood, threading the mazes of their covers with wonderful swiftness.

The Guinea-fowl is a good layer of nice, rich eggs. They lay a larger number than ordinary fowls do. The flesh of the Guinea-fowl is very good eating and is considered a very good substitute for game. The Guinea-fowl is of a wild, shy, rambling disposition and is very impatient of restraint. It loves to wander in the jungles, gardens and fields, hence these birds require careful watching for the hens will lay in secret places and will sometimes absent themselves entirely from the farm yard until they return with a young brood around them. So ingeniously will they conceal themselves and their nest, so cautiously leave it and return to it, that they elude the searching glance of boys well used to bird nesting. But it may always be found from the watchful presence of the cock while the hen is laying.

The best plan is to contrive that the hens shall lay in a quiet secluded place, and to give the eggs to a common hen ready to receive them who will perform the duties of incubation with steadiness. The young must receive the same treatment as those of the turkey, and equal care. In a short time they begin to search for insects and their larvae, and with a little addition to such fare as this and what vegetable matter they pick up, will keep themselves in good game condition, without cramming or over-feeding.



GUINEA-FOWL.

Though they are very profitable birds as they are capable of almost entirely procuring their own living, they are rejected by many on account both of their wandering habits which give trouble, and their disagreeable voice resembling the noise of a wheel turning on an ungreased axle-tree. The males, when pugnacious, are capable of inflicting considerable injury on other poultry with their stout hard beaks. They should not be kept in the yard with other poultry for they will make the lives of the fowls unendurable.

Like their wild progenitors, domestic Guinea-fowls prefer roosting in the open air to entering a fowl-house. They generally choose the lower boughs of a tree or the branches of large thick bushes, and there congregate together in close array. Before going to roost they utter frequent calls to each other and when one mounts the others follow in regular

order. They retire early, before the common fowl or the pea-fowl.

Guinea-fowls are very valuable in a garden or orchard as they will keep the place free from snails, slugs, caterpillars, bugs and other insects that destroy fruit and flowers. They will also keep the place clear of frogs and snakes and such like injurious reptiles.

The Guinea-fowl is not so large a bird as it appears, its loose full plumage making it seem larger than it really is. When plucked it does not weigh more than a common fowl. The male and female very much resemble each other, the male, however, has the casque higher, and the wattles are of a bluish red, the wattles in the female are smaller and red.

The common variety has a horn, red wattles, white under eye, and white ear-lobe, neck-hackle a brownish grey. The body is grey, speckled all over with white spots, the grey running to purplish black in places. Legs are dark or slate. The carriage of the stern is very low, the profile of back and tail appearing almost like a segment of a circle. In some cases, the colour is reversed and is greyish white, speckled purplish.

There is a breed of pure white Guinea-fowls. The white birds are very pretty. There are also pied and black ones. I have also seen some of a deep blue colour.

Selection of Breeding Stock—The males and females should be as large as possible. Size is of chief consideration. The cock and hens should be of the same colour, vigorous and not under a year old. There should be two hens for each cock, and the cocks and hens should not be related.

House—A large shed securely enclosed with strong half-inch or inch wire-netting is the most suitable house one could provide for these birds. There should be a number of high perches in the shed and the floor should be covered with sand or ashes. The house should face the south. It will be found that they will prefer to roost on the branches of large trees. Adult birds should be allowed to do so, it will

not do them any harm but on the contrary, a great deal of good, as they are very hardy and will not be injured by exposure. It is very different with the chicks. They are extremely delicate and need a great deal of care and protection. They should not be allowed to roost on trees until they are full grown or at least six months old.

Food—Guinea-fowls will pick up nearly all their food if allowed perfect liberty. All the additional food they require is some whole grain such as wheat or paddy in the morning and evening, as they are not large feeders. If a small quantity of grain is scattered on the ground under a tree it will do. A vessel with clean water should be put in some place where they can easily get to it. They will pick up all the animal food, green food and grit they need from the garden and fields.

Shed—It is impossible to keep Guinea-fowls in confinement. They will fly over the highest fence unless the yard is covered over with wire-netting. They become very restless and unhappy under restraint. It is best not to try to confine even the young ones.

Rearing—The hen will lay from 30 to 40 eggs before she becomes broody. She will very seldom lay in a house but will choose some bush, tall grass, or jungle in which to make her nest. Here she will lay all her eggs if undisturbed she will forsake her nest and make another in some secluded spot.

With the exception of the nest egg, the eggs should be taken away daily, for if they are allowed to accumulate and are then removed the nest will be deserted. The birds should never see the eggs being removed, it should be done when they are not near the place. More than one hen will lay in the same nest. Guinea-fowl's eggs should be placed under common hens, two or more hens should be set at one time. The common hen makes a good mother for the Guinea-chicks and as soon as the young Guinea-fowls have gotten their feathers, the adult birds will come and take possession of

them, and the young ones will go with them and wander about the garden and orchard. The young birds should be placed in a separate house or large coop during the night. The mother hen should be allowed to stay with the chicks as long as she desires to, the chicks will need the shelter of her wings at night.

It takes twenty-six to twenty-eight days for the eggs to hatch. If two or three hens are set together, the first ten chicks hatched should be given to one hen, and the remaining eggs given to the other hens. They will bring up these last chicks. Guinea-fowl chickens are very delicate little birds and need great care. They cannot endure the least damp or wet, nor can they stand much of the sun or east wind. For the first twelve or sixteen hours the birds should be allowed to remain undisturbed under the hen, after that remove the hen and chicks to a large dry box or coop with a wooden bottom. Place some coarse sand, brickdust and grit in the box. An egg should be boiled hard and when cool minced up very fine, a little black pepper and whole wheat flour being sprinkled over it. It should then be scattered over the sand and gravel in the box. The hen will call to the chicks and they will come out and eat what they want. The hen should be fed separately and given plenty of grain and water. The one thing to be always borne in mind is that Guinea-fowl chicks must be fed every hour and given only a little at a time. If this matter is neglected even for a few hours, the chickens will be ruined. The best food for Guinea-chicks is hard boiled eggs, finely chopped lettuce and onions, white ants, minced boiled meat, and ground rice and wheat. For the first week they should have eggs, white ants, ground rice and lettuce. During the second week, white ants, lettuce, onions, rice and wheat should be given. After the second week, white ants, lettuce, onions, rice, wheat and minced meat are fed. The chicks will not thrive unless they have white ants and lettuce from the beginning. Water should be given after the third day and then four times a day. During dry days the

chicks should be placed out under a coop on the soft *doob* grass. They should be allowed to remain out as long as possible, but care should be taken that they are protected from the sun, rain and strong winds. The coops should be removed to new ground every day. When the chicks are a week old they should be allowed to run out with their mother and should be confined as little as possible. The greatest precaution should be taken to prevent their getting in the least wet. I have seen whole broods of chicks destroyed from a single wetting.

The egg diet should be discontinued after the first week, but the lettuce, onions, meat, wheat and rice should be continued until the birds are at least three months old when they will be large and strong enough to fly with the adult birds and forage for themselves. From three to six months old, they should be fed only three times a day on wheat, paddy and other grains.

Disease—Guinea-fowls are very hardy and seldom become ill, but when they do there is very little chance of doing anything for them. The only thing to do with a sick bird is to kill it. They are too wild and timid to catch, and the very effort to catch them will injure the birds. All sick birds should be removed from the flock as soon as possible.

CHAPTER XVI

PIGEONS

There are more than 650 species of pigeons living in almost every part of the world.

Pigeons raisers have developed about 130 breeds of domestic pigeons. We will mention a few. The Carrier pigeon is a very handsome bird used as a show bird. The Racing Homing pigeon has rare speed, courage and intelligence, and an unerring homing instinct. They can carry messages hundreds of miles back to their homes. One of the most popular kinds of pigeons is the Tumbler. It is the acrobat of pigeons and a stunt flier. The Fantail has long been a favourite with breeders. Pouters are both the clowns and aristocrats among pigeons. He is a vain fellow who puffs out his chest when anyone pays him attention.

Some pigeons can be bought for a few cents, while others cost several thousand dollars. Those who want to keep fancy pigeons should procure J. C. Lyell's book on pigeons.

My purpose of this chapter is to give information of pigeons for the table. They are very easily kept and most profitable birds.

Pigeons when properly kept are very profitable as they find nearly all their food and raise from six to ten pairs of young ones during the year.

There are many varieties of fancy birds and a number of common ones, but the best for table purposes are the Homer, the Dagoon, the Lucknow or Lahore gola, and the common clean-legged Sharajji. Some people keep the common small gola or wild pigeon, but they are small unprofitable birds. The breeds I have mentioned are large plump birds, quite tame and easily kept.

The common Homer and Dagoon are called Bagdads in Calcutta. They are large birds and are found in all colours,

some are black, some blue, some pied and some white. The people in India are not very careful about breeding for colour.

The Lucknow and Lahore golas are of different shades of blue. They are large handsome birds, carry a lot of flesh, and have no feathers on the feet. These birds are the best I have found, as they are very hardy and breed fast.

The clean-legged Sharajji is larger than either the Bagdad or Lahore gola, but it is not so prolific. Good large birds of this breed can be had in Lucknow and other large cities.

For breeding purposes, only the largest birds should be selected. I would advise the reader to keep only one breed and to select the best of the lot for breeding and use the small and otherwise defective birds for the table. If only one breed is kept, there will be enough squabs for the table and also some pure bred birds to sell for breeding stock. If there is no intention to sell birds, then the three varieties mentioned may be kept together and allowed to inter-breed. The cross bred birds will be large and hardy and very good for the table.



HOMER PIGEON.

The House—The building of a pigeon house is an important consideration. I would not advise lofts or boxes for pigeons, for if they are crowded together they will not thrive.

They need a properly ventilated and roomy house where they will not be disturbed by cats, crows and hawks. Build a house twenty feet long and ten feet wide, running north and south; side-walls nine feet high, the centre supported by posts; an opening on the north, six feet by four feet enclosed with half-inch mesh wire-netting; a door on the south, six feet by four feet made with a wooden frame and half-inch wire-netting; roof made of bamboo and thatch. While the walls are being built, place large earthen *gharras* (native water vessels) with large mouths (the opening in the *gharra* should be ten inches in diameter) in the walls. The *gharras* should be placed on their sides a foot apart in a row with their necks on a level with the wall, then the soft clay put between the *gharras* until they are firmly fixed into the wall. Six inches of clay are placed on the wall over the *gharras* and then another row of *gharras* is placed on this in the same way as the lower row. In this way there are four rows of *gharras* on each side of the wall. These make beautiful nests for the pigeons and have the special advantage of being easily cleaned. Long bamboos are placed in front of each row of *gharras*, a foot and a half from the wall, the two ends are built into the walls at the sides. Such a house can accommodate 50 to 60 pairs, allowing two nests for each pair of breeders. The birds multiply quickly and soon there will be plenty to eat or to sell.

A thick layer of sand should be spread on the floor of the house, and a large quantity of pounded mortar placed in the corners. The floor of the house should be at least a foot and a half from the ground.

There should be a small trap door attached to the upper part of the large door by which the pigeons can come in and go out of the house at pleasure. This trap-door should be open all day but shut at night.

The food and water vessels should be placed outside of the house in a clean shady place, and the floor of the house should be swept regularly and kept clean. The nests should

be cleaned out frequently and if there is any vermin in them a strong solution of phenyle or some kerosene oil and phenyle should be freely applied.

Some clean dry hay or grass cut into pieces a foot in length should be placed near the house to enable the pigeons to make their own nests.

The walls of the house and the nests should be thoroughly whitewashed regularly.

Vermin should never be allowed to infest the pigeon house.

Food—The feeding of pigeons is a very easy and simple matter. They should be fed twice a day. The best food is the small green pigeon-pea found in the bazar. It is cheap and the birds are very fond of it, and the young ones thrive well on it. Peas, wheat, small gram and mustard seed are the best grains for pigeons. Paddy, oats and barley are objectionable because they frequently injure the crop of young birds and cause much harm. The grain may be scattered on the clean ground or placed in wooden troughs.

Vessels filled with clean water should be kept near the house so that the birds may drink whenever they desire to do so. A small quantity of Douglas' Mixture should be put in the drinking water.

Pigeons are very fond of salt, and this should be regularly supplied as it is very necessary for their health. The best way to give it is to take two seers of salt, one seer of flower of sulphur, one seer of quicklime and four seers of clean sifted clay, mix the whole up with sufficient water to make a stiff paste. The mixture must be thoroughly kneaded for about an hour, and made into large balls and placed on bricks in the house. The birds will soon learn to go to the balls and eat the salted mud.

Killing For The Table—As soon as the squabs are old enough to leave the nest, they should be killed for the table. At this period they are quite fat and tender. Some of the best young birds should be reserved for replenishing the stock.

Pigeons live to a great age. Some have been known to

live fifteen to twenty years. I would advise people not to keep birds older than four or five years of age. The old birds should be killed for the table, and the best young ones put in their place.

Diseases—If allowed perfect liberty and kept properly, pigeons will be found to be hardy, but if kept in close confinement they very soon become sick.

Pigeons are subject to the same diseases as fowls, and need the same treatment. See book on Poultry-keeping in India. The best thing to do when they are attacked with cholera, roup, canker and liver complaint is to immediately kill the sick ones and burn them to ashes, or else bury them deep at a distance from the house.



CHAPTER XVII

THE PEA-FOWL

Varieties:—The Pea-fowl is found all over Asia and the common Pea-fowl in all parts of India. A very beautiful variety is imported from Upper Burma and from Japan and brought to the seaports of India. The colour of this bird is very brilliant and much richer than that of the common species, the neck and breast being a bright glossy green laced with gold, the shoulder deep blue and the back rich bronze, the tail coverts are very rich green. The colouring of this variety is far superior to that of the other.



PEA-FOWL.

There is also a variety of pure white Pea-fowl. They are exceedingly handsome birds.

The common Pea-fowl is hardy and so also is the Japan bird, but the white ones are somewhat delicate. The white birds are very rare and expensive.

Pea-fowls are most useful birds. It costs very little to feed them and they are ornaments in the park and garden.

They also most effectively keep the place free of snakes and poisonous reptiles.

The Pea-fowl does not reach maturity before it is three years old and not until then does the male acquire his glorious plumage.

House And Food—Pea-fowls love to roost on trees and it is with great difficulty that they can be induced to enter a house; only when they have been reared from young chicks and habituated to roosting in a house will they do so. It is best to have a large shed about twenty feet long and fifteen feet wide, built on high posts and enclosed with wire-netting and provided with high perches for the birds to live in. They should be allowed out in the morning and shut up at night. They should be given their morning food and water in the shed and again about sunset should some food and water be placed in their shed. By doing this, the birds will be encouraged to take to their house and roost there at night. The Pea-fowl is about very early in search of food, so they should be let out as early as possible in the morning. Pea-fowls like Indian corn, wheat, peas, fruit and vegetables. If, therefore, some Indian corn and wheat are given in the morning before the birds are let out, and some chopped vegetables and grain in the evening after they come home to roost, it will be all that they need. Any animal food they need will be picked up from the garden and orchard.

Pea-fowls are very timid and rather wild, but if treated kindly from the time they are chicks, they will become very tame and come up to the house and eat out of your hand. If provoked, however, the Pea-cock becomes very savage and will attack a person and do him severe injury with his beak and spurs. It is best to allow the birds to remain in the garden or orchard. The house for the birds should be built in a quiet part of the garden.

Pea-fowls should never be allowed to remain in the poultry-yard for they will ill-treat the chickens and small fowls.

Breeding—One cock should be allowed for three or four hens. I would advise keeping two cocks and six hens. The hen usually lays her eggs in some secluded place in long grass under shrubs or jungle. They are very much like the Guinea=fowl about laying—if they are disturbed, they will forsake their nests or else destroy their eggs. It is not safe to allow the Pea=hen to make her nest in the jungle for she will be attacked by jackals, wild cats, etc. The eggs should be gathered in the same way as Guinea=fowl's eggs are gathered and placed under common hens. The hen should be a properly feathered and large one. If it is possible to get the Pea=hen to make her nest in her shed and raise her own chicks, it would be well indeed, but it will be found almost impossible to get the Pea=hen to raise her own brood in confinement.

Rearing—When setting the eggs under ordinary hens, only four should be given to each bird. The Pea=hen lays from six to ten eggs, they are large and greenish white. The eggs take from 26 to 28 days to hatch and the chicks should be treated in the same way as Guinea=fowl chicks are treated. The first food must be white ants and ground Indian corn. Worms, minced boiled meat, onion tops, lettuce, wheat, rice, ground barley and oats, and fruit of sorts should form the food given to young Pea=fowls for the first three months.

The Pea=cock is of a peculiarly jealous nature and will break all the eggs he discovers and kill all the young chicks he may find, and for this reason the Pea=hen hides her eggs and young ones from the male bird. When the hen sits on her eggs in the house, the male bird must not be allowed to come near her and he must be kept away from the young chicks.

Pea=fowl chicks need the same treatment about shelter and liberty as do the Guinea=fowl chickens. After the birds are about two or three weeks old they need not be confined at all during the day when the weather is fair, but they must

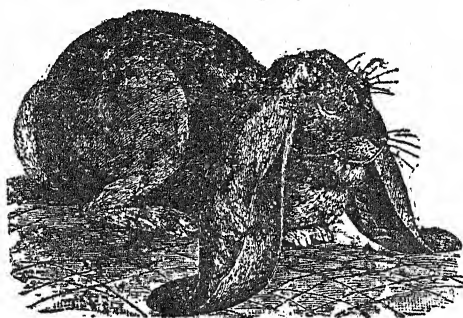
not be allowed to get wet. They will walk with the hen and hunt for white ants, grubs, etc. They must be regularly fed four times a day until they are six months old and after that twice a day. There is a certain period in the early part of the Pea-fowl's life when it is very delicate. It is when they are changing colour—that is emerging from the chicken feathers to that of adult colour—their first moult.

CHAPTER XVIII

THE RABBIT

Rabbits have an interesting history. They were bred by the Chinese for use in religious ceremonies at the time of Confucius. Early Roman and Greek writings mention them.

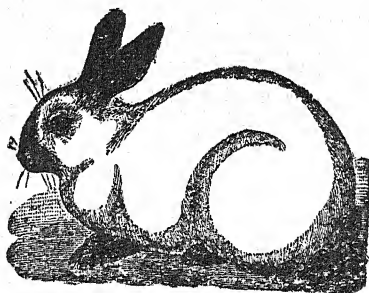
Rabbit meat is very popular. It is much like chicken. It was largely used in World War II when there was a meat scarcity.



LOP-EARED RABBIT.

Rabbits make good pets for children; they are easily kept, are hardy, multiply rapidly so they are profitable.

There are many varieties. We will mention a few of the best.

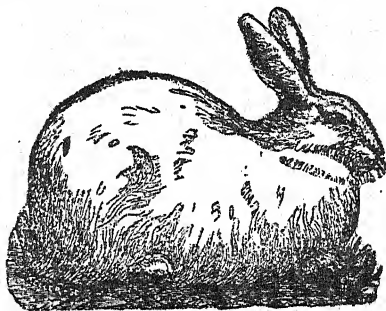


HIMALAYAN RABBIT.

The Lop Eared—They are large animals and have enormous drooping ears which often measure twenty-two inches from tip to tip and six inches in width. They have large dewlaps. They are of different colours, black, grey, white, blue, fawn and yellow, also mixed colours, and often weigh from sixteen to eighteen pounds. The lops are somewhat delicate and their long ears need special attention.

The Angora—This is a very handsome and useful variety. The colour is pure white with a coat composed of long, fine, fleecy fur, and the eyes pink. They are good breeders and attentive mothers and grow to a good size, but are not so large as some other breeds.

The Himalayan—This is a pretty variety. The body is white and the fur short and fine, while the ears, nose, feet and



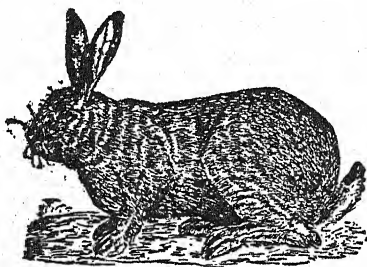
ANGORA RABBIT.

tail are dark nut brown or black; the eyes are red, the ears are very short and firm. They weigh from five to seven pounds, and are extremely hardy and prolific.

The Patagonian Rabbit—This is the giant of the species averaging from fourteen to fifteen pounds. Some authorities claim them to be an offshoot of the Belgian or Flemish. Their colour is iron-grey, somewhat tawny, and coat rough. They have large, thick heavy ears, the tips of which are soft and pendulous and usually carried standing out from the head like the letter V. In this variety are found the several styles

of lop=ear, namely, half=lop, horn=lop, and oar=lop, which are considered very objectionable.

The Flemish Giant Rabbit—This rabbit is one of the popular large breeds. It is claimed by some that the Flemish is an overgrown Belgian, continued selection and breeding having resulted in the present variety. One will meet more Belgian=Flemish crosses than pure blood of either variety. The Flemish Giant weighs from twelve to fifteen pounds and in colour is a dark steel=grey, ears about six inches long and carried erect. This variety possesses a large dewlap, eyes dark brown, bull=dog shoulders, and massive hind quarters. They are quite prolific and hardy.



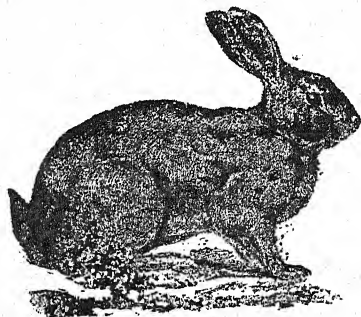
FLEMISH GIANT RABBIT.

The Silver=Grey Rabbit was originally a near neighbour to the Himalayan and has become a favourite in Europe and England. They have improved wonderfully in appearance since their introduction. In colour they run from a bluish brown to a black cinder colour, the ideal rabbit being a dark blue cinder colour and well silvered with white hairs tipped with black. They are good breeders and are hardy, growing to a good size, often weighing ten pounds at maturity. The Creams and Fawns are offshoots from the Silver=Greys, and are probably sold as such. They share the popularity their ancestors enjoyed and are favourites in England.

The Belgian Hare—This variety is said to have originated in Belgium. They are called Belgian Hares simply on account of their resemblance to the hare. It was for a long time sup=

posed that this valuable rabbit was a cross between the hare and the rabbit. This is not so and all attempts to produce the hybrid have either resulted in failure or the production of a sterile mule. The habits of the hare differ so materially from those of the rabbit that the crossing is effected with great difficulty.

The hare is born fully developed, with eyes open and can run about and eat immediately ; while the rabbit comes into the world blind, naked and helpless, and does not venture from the nest until from two to three weeks old. The hare nests on the ground in some sheltered location, never burrowing , while the rabbit always burrows in the wild state and will do so in captivity, if allowed.



THE BELGIAN HARE.

The Belgian of today shows the improvement attainable by judicious and systematic breeding. Foremost in importance is their increased size and prolificness.

To describe properly the Belgian Hare is difficult, especially as to the colour. It is a reddish tan, clear and bright, showing clearest on the top of the neck and shoulders of the animal. Each hair of the animal is tipped with black and its value is estimated according to the density and distribution of this black marking. The more mottled and wavy it appears the more points are scored. Starting at the shoulders, the colour shades darker over the back and sides, and here the black tipping is shown to great advantage ; the haunches are

of a grey colour, but showing a distinct brownish cast and are usually well marked, with wavy black tipping.

The head and ears have a dark shading but no distinct tipping. The head is not large in proportion to the body, it is carried well up and is graceful. The forehead is flat and very prominent over the eyes, giving them a very prominent appearance. The eyes are bold, round, and of a dark brown colour, possessing a wonderfully pleased and contented expression. The ears, about five inches long, set up firm, close together, and leaning slightly back, having an edging of black over the tips and extending well down the edges. This edging is termed lacing and is characteristic of this variety.

The fore-feet and legs are small and delicate and are kept well under the animal. They are well coloured and free from white.

The belly and the underside of the tail are white, preferably with a brownish cast. The hind feet and legs are large, strong and powerful, while generally lighter in colour than the fore-feet, they must show no white on the outside or top. The slightest white on the face, legs or body of a Belgian Hare is a disqualification in the show room.

Shape in the Belgian is, aside from colour, the chief attraction and it is difficult to secure and maintain. The Belgian should be long and slim in build, long and fine in bone, narrow in front, long and lean in the head—in fact, a rabbit calculated to give the observer the impression of speed. This length is to be accompanied by a corresponding gracefulness and symmetry of form. The angular, gawky, stumpy or mule-like forms being decidedly objectionable.

The English standard for weight is about eight pounds, which could, in this more favourable climate, be made more, say nine pounds. Specimens are occasionally shown weighing from ten to eleven pounds.

The Belgian Hare is hardy and the young ones can be reared with ordinary care. They are prolific and produce

from six to ten at a litter, and will breed from six to eight times a year. They are also very docile.

The Indian Rabbit—The Angora and the Himalayan Rabbit can be had in India. The Angoras are very common but have deteriorated greatly in size and shape on account of want of proper breeding and care. The Himalayan is not so common and with careful breeding can be greatly improved. There is also the common rabbit which may be black, red, brown, black and white, brown and white, or grey. It is of no use breeding from the cross-bred common ones except for the market.

Other Varieties—There are a number of other varieties of English, Dutch, French, Egyptian, Japanese and other rabbits but none of them are as good as the varieties I have described above.

The Hare—The hare is very common in India, but I have never known it to breed in confinement.

The Rabbitry—The building of the rabbitry is a very important consideration, as the health of the animals and success in breeding depend a great deal upon the way they are housed.

When only one or two rabbits are kept, a good hutch is all that is necessary for them. A hutch six feet long, three feet wide, and two feet six inches high, will do for one rabbit. The hutch must be divided into two compartments. Two feet at one end must be enclosed with boards as a breeding-box, the remaining four must be enclosed with half-inch mesh wire-netting. The roof of the hutch must be sloped on both sides to let the rain run off, and must be made of good strong stout planks, over which should be placed a sheet of tin or some oiled canvas. The bottom of the hutch must be good thick wood, with half-inch holes bored every three or four inches apart, the bottom should slope slightly to one side to allow the water to run off. The compartment at the end should be as dark as possible, with only an opening between it and the other part of the hutch to enable the rabbit

to go in and out at pleasure. There should be two doors to the hutch, one at the side enclosed with wire, and one at the side of the dark compartment; these doors should be large enough to enable a person to clean the compartments properly. Some dry, sweet straw or hay, but not grass, should be placed in the dark compartment. Rabbits delight to burrow in the hay, and they also like the privacy of their dark bedroom. A doe cannot bear to be watched while making her nest and caring for her young. Food and water should be placed in the outer compartment. The hutch should be placed in the sun during the early morning, and under a shady tree in a quiet place during the hot part of the day. Great care must be taken to protect the animals from the great heat during the hot weather, and they should also be protected from wet during the rains.

When a large number of rabbits are kept, a regular rabbit house should be built. Build a house twenty feet long and ten feet wide, side walls seven feet high, centre supported on wooden posts; the house should run from north to south, the east and west should be walled up with mud, the north and south should be enclosed with fine wire-netting with a doorway on the south. The roof may be of thatch. The floor should be raised at least eighteen inches from the ground. The floor may be made of mud, but in order to prevent the rabbits from burrowing in the ground, good strong eighteen-gauge one-inch mesh wire-netting should be laid down three inches under the surface of the floor. I have sometimes used thin corrugated iron sheets for this purpose with very good results. The wire-netting should be carried up three feet against the wall and secured with strong and long iron nails. This will very effectually prevent not only the rabbits from burrowing in the ground and walls, but also rats and snakes from entering the house. If rats are allowed to get in they will destroy the young rabbits and do the large ones much damage.

Boxes twenty-four inches square should be placed against

the wall in the house for the does to use as their bedroom and nurseries. Each doe should be allowed one box. Twelve does may be kept in a house twenty feet long and ten feet wide. Earthen *jallahs* may be used instead of boxes. *Jallahs* are to be preferred to boxes as they do not breed vermin as fast. *Jallahs* thirty inches high and eighteen to twenty inches in diameter will do. These *jallahs* should have wide mouths, at least twelve inches in diameter. They must be laid on their sides against the walls in the house and secured so that they will not move or shake. Clean soft straw or hay should be placed in the boxes or *jallahs*. In such a house the rabbits will live in comfort and health and multiply rapidly.

The bucks should be kept in hutches or in separate compartments in a house. Bucks cannot be kept together for they will fight and do each other very severe injury.

As soon as the sexes can be distinguished, the young ones must be separated. The females should be put in a house by themselves, and the males kept by themselves until they are about four months old when they fight and become troublesome. A few of the best should then be kept and the remaining ones used for the table or else sold in the market.

Rabbits need to be protected from wet and damp as well as from the great heat of the sun.

Food—The best grain for rabbits is gram and wheat steeped in water for a few hours. Carrots, cabbage and cauliflower leaves, turnip and radish tops, lettuce, beetroot, green corn, raw onions, wheat, barley, fresh cut *doob* grass and plantains should also be given. Only a small quantity of food should be given at a time, a little and often, otherwise it will be rejected and spoiled. The food should be given in wooden troughs which should be allowed to remain in the house always as rabbits love to eat at night.

Always remember that the fresher the food the better. Trouble is caused by wet stuff being allowed to lie in a heap thereby steaming and sweating until unfit for use. At the same time, avoid wet green food if fresh and dry food is pro-

curable. Remember that a heap of green stuff in the hutch to be trodden upon and covered with filth is, to my idea, an unpardonable condition of affairs, and is often the cause of serious trouble. Nursing does should have as much as they can eat, green corn, carrots, fresh *doob*, etc., are excellent milk-producers and should be given with sound gram, barley, and oats. Give cool fresh water four times a day.

The food vessels must be securely fastened in their places, or the contents will be upset and wasted.

There is a kind of plant the Indians call *Akra* in Hindustani, of which rabbits are very fond. It grows wild and very profusely on the banks of rivers and tanks and on low-lying land. Rabbits will eat the leaves and stocks greedily and thrive well on it. It should be gathered fresh every day as it very soon turns black and begins to smell. If kept in water it will last good for a day.

Water—Rabbits should be allowed water to drink three times a day and oftener during the hot weather. The water vessels should be perfectly clean and the water quite pure. There is no sense in the popular belief that rabbits should not be allowed water. The water vessels should be removed after the rabbits have had a drink.

Cleanliness—It is very necessary to keep the house and hutch absolutely clean and sweet. The least uncleanness will cause disease among them and breed vermin in the house. The dark chamber should be cleaned out every other day or at least once in four days and the bedding changed. This should be done while the rabbit is in the other compartment. She must not be disturbed while in the dark chamber. The outer compartment of the hutch must be properly cleaned and washed with phenyle and water and then dried. The dark chamber should never be washed, but must be properly swept every day and phenyle sprinkled on the floor. The boxes must be thoroughly cleaned and the straw changed every other day. The earth for the surface of the floor must be removed and renewed every month or so. No decaying vege-

tables or foodstuff must be allowed to remain in the hutch or house.

Breeding—Success in breeding depends a great deal on properly mating the rabbits. If wanted for pure breeding and fancy, then the different breeds must be kept separate and only the best specimens of each breed mated together. But if they are wanted only for table use, then some of the breeds may be mated with larger and better breeds to give size and stamina to the progeny. The best results are obtained by keeping the breeds distinct and mating the best females with the best males of the breed. If inferior specimens of any breed be bred from, the young ones will be inferior and the stock soon deteriorate. Only the largest and most perfect females must be mated with the largest and most perfect males. If this is done the progeny will be more likely to be large and perfect. Not only must the buck be a large one, but the doe must be large and good.

One buck will be able to serve from six to twelve does. When the buck's services are required, he should be put in the doe's hutch and allowed to remain with her a couple of days. He must then be removed and put back in his own hutch. On no account should the buck be allowed to remain with the doe for any length of time. If he is left with her after she has been served, he will continue to worry her and do her serious injury.

After the doe has been with the buck she should be placed in the hutch or house she is expected to rear her young ones. She must become quite used to her new quarters and make her room comfortable and ready for her coming little ones; during the whole period of pregnancy she must be kept perfectly quiet. If she is disturbed or excited at all, she will either kill or neglect her young ones when they are born.

The period of pregnancy is thirty days. Three or four days before the young ones are expected, the doe should be provided with a lot of clean dry soft straw. With this she will make her own bed and prepare the place for the young

ones. After she has made the bed, she will cover it with fur which she will take from her own body.

During pregnancy the doe must be fed and watered regularly and the day the young ones are expected some extra grain and green food should be left in the hutch and a supply of fresh water must be kept in the hutch. At the time of kindling, the doe seems to have an unusual thirst and in her frenzy for water, she will destroy her young ones and appease her thirst with their blood. By giving water at this time it will prove beneficial to the mother and save the lives of the young. The doe will need extra and nourishing food at this time. Some milk and bread, whole barley, wheat, carrots and *doob* grass must be given to the animal.

Young does sometimes kill their first litter or neglect them. This happens from their becoming excited and possibly frightened, but probably it will not occur with the second litter if properly managed.

The doe must not be disturbed nor the young ones touched for three days after they are born. Then carefully remove the doe from the hutch by giving her a carrot and inducing her to take a run for an hour in the room. When the doe is not present, examine the young ones and remove any that may be dead. Do not disturb the nest and do not allow the mother to see you handling her young. After an hour get her back to her hutch and she will begin to nurse her young ones.

A doe cannot bear to be watched while making her nest or caring for her young. When she wishes to attract attention to her babies, she will bring them of her own accord to the front of the hutch. When first born the youngs are helpless, naked and blind, and demand their mother's tenderest care. If they are handled while very young their parent sometimes deserts them and is at all times greatly distressed by the attention. It is best then to leave the young rabbits alone. While the doe is nursing her young she requires extra food, for the young grow fast, and if the doe is not well cared

for, she in turn cannot do justice to her young and they will have *slobbers* if not sufficiently nourished.

In two or three weeks the young will be moving about the hutch. From now until weaned is the critical time in their existence. With the food and care recommended, they will thrive. When about two months old they should be taken from the doe and allowed to run on the rabbitry floor, the doe being started for another family. Exercise is very necessary for their proper growth and health.

The young ones should be fed on milk and bread, soaked gram, wheat-bran, carrots and tender fresh vegetables and *doob* grass.

Separate the sexes when taken from the doe and at four months of age separate the males, as they get quarrelsome and the weaker ones are completely ruined in their fights. Do not breed a doe under eight months of age and not over four times a year. By this arrangement she will raise strong, healthy litters until four or five years of age. For breeding purposes an old buck and a young doe beget the largest young.

A male should not be bred from before he is one year old, nor a female before she is eight or nine months old.

Diseases—If rabbits are kept in the way mentioned above they will thrive and do well. It is much better to prevent disease than try to cure it. When you see your rabbit sitting and moping in a corner paying no regard to his meals etc., you may rest assured that it is not in good health and you should immediately try and find out the reason and apply the remedy.

I will mention some of the diseases rabbits are subject to and the remedies that may be given.

1. *Loss Of Appetite*—Caused by cold or indigestion, give the following medicine, one drop of tincture of Nux Vomica in half a pint of drinking water. The next day give one drop of tincture of Aconite in half a pint of drinking water. Keep giving these two medicines every other day alternately. Give the animal the water with the medicine every three hours. Feed on milk and bread.

Blindness In Young—Sore eyes and blindness is caused either by injuries to the eye by projecting nails and wire, and also by filth in the hutch or house, bad feeding, impure water, chills and cold.

Give one drop of tincture of Belladonna in half a pint of drinking water, also tincture of Aconite as above, every alternate day. Bathe the eye with a weak solution of alum and water—a teaspoonful of ground alum to a pint of water, keep in a cool dry place.

Canker—Canker in the ear or any other part of the body is very difficult to cure. Unless the animal is a very valuable one it should be destroyed and buried.

4. *Colic*—Caused by indigestion or constipation. Give half a teaspoonful of Epsom Salts dissolved in warm water every day until the bowels are freely moved.

5. *Constipation*—Caused by dry food, want of proper exercise, and chills. Give Epsom Salts and stop all grain and dry food, give only onions and green food.

6. *Diarrhoea*—Caused by excessive heat or chill, a fright, sour food, too much green food, impure water or dirt. Give some cholera medicine. Tincture of Veratrum Album, one drop in half a pint of water is very effectual. Feed on dry gram, oats, and barley, but no green food until cured except lettuce.

7. *Dropsy*—The body swells and the animal refuses food. Remove to a large room or enclosure and allow it to run about. Feed on dry food.

8. *Ear Ache*—Caused by dirt and wax in the ear. Clean out the ear and gently syringe with warm water. Then apply some tincture of Aconite or Hydrastis. Avoid catching by the ear.

9. *Fits*—Kill the animal.

10. *Sore Hock*—Caused by dirt, injuries, damp and thorns. Wash with warm water and apply tincture of Hydrastis or Elliman's Embrocation. Keep clean and feed properly.

11. *Vermin*—Caused by uncleanness or bad health. Apply Keating's Insect Powder freely and wash the hutch with strong phenyle and water.

12. *Mange*—Isolate the animal and apply the following ointment:

Cocoonut Oil.....	8	ounces
Spirit of Turpentine.....	4	"
Camphor.....	1	"
Flower of Sulphur.....	4	"

Dissolve the camphor in the turpentine and add the cocoonut oil and sulphur; and apply every day to the affected parts. Give some sulphur in its food and a good supply of green food and water. The hutch must be thoroughly cleaned and removed from near other hutches.

13. *Paralysis*—Kill the animal.

14. *Red Water*—This disease is often called bloody urine. This is a disease of the kidney and needs special care. Give tincture of Aconite one drop in half a pint of water. Also give tincture of Arnica in the same way as Aconite. Feed on milk and bread and give clean water. Mild exercise and plenty of fresh air are very necessary.

15. *Vent Disease*—Caused by injury by the buck or bite from rats or insects or injury from nails or thorns. Separate the animal and wash the part with phenyle and water and apply iodoform and vaseline twice a day. If taken in hand at once, a cure will be effected. But if the sore has spread and entered the vent it is best to destroy the animal. Even after the doe is cured she should be kept separate from the buck for six months.

16. *Snuffles Or Influenza*—In the English breeder's hutches, snuffles is almost always present and is invariably fatal if not promptly attended to. The Indian fancier is often troubled by the disease. Just as a man neglects his own person when suffering from a cold, so is the person apt to neglect the rabbit. But a cold is always a matter of concern in a rabbit and should receive immediate attention. The symptoms of snuffles are sneezing, moist nostrils, which in a few days

become thick and filthy, the animal refuses food, and its coat becomes rough and disordered giving every sign of illness and discomfort. The sick rabbit must be isolated immediately. Give the animal tincture of Aconite one drop in a quarter of a pint of water, also Liquor Arsenica in the same way. The medicine should be given four times a day. Wash the nose and mouth well with Condyl's Fluid and water, also the forelegs and feet two or three times a day, wipe dry and put an extra quantity of fine hay in the hutch, keep in a cool airy place and feed with stimulating foods. Where this course does not effect a cure, the following prescription is recommended which must be used in an ordinary vaporizer. Fill the vaporizer about two-thirds full of boiling water, into this pour half an ounce of soluble Sanitas Oil, one teaspoonful of oil of Eucalyptus and ten drops oil of Camphor. Place the top on and light lamp underneath. Place the rabbit in a small hutch, covering up with old sacks to prevent the escape of the steam. Insert the spout of the vaporizer into the lower part of the hutch allowing the steam to enter. Treat in this manner for ten or fifteen minutes, care being taken that the invalid is not suffocated by the operation. After the treatment leave the rabbit in the hutch for half an hour, then remove. It is said that three operations generally effect a cure.

17. *Apoplexy*—If not protected from the excessive heat in hot weather a number of the rabbits will die. The best thing to do is to adopt preventive measures. Place the hutch in a shady cool place, where there is plenty of fresh air. Give plenty of cool water and green food but stop the gram and other stimulating food.

18. *Fatty Degeneration*—This is caused by over-feeding and want of sufficient exercise. Breeding stock should not be fat but kept in good condition and allowed regular and sufficient exercise.

19. *Injury To The Head*—Rabbits must be handled very carefully and when caught or taken up, should be held by the ears, also placing a hand under the animal.

